GATES LEARJET CORPORATION

maintenance manual

CHAPTER

23

COMMUNICATIONS

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COMMUNICATIONS - DESCRIPTION AND OPERATION

1. Description
   A. This chapter includes maintenance information for speech communication, passenger address and entertainment, audio integrating, static discharging, and voice recording systems.

SPEECH COMMUNICATION - DESCRIPTION AND OPERATION

1. Description

A. The speech communication system consists of the VHF communication system, HF communication system, and UHF Flitefone system.

NOTE: The speech communications installations may vary depending on optional equipment installed. The mechanic should check the list of optional equipment on his particular airplane to determine which particular system is installed before proceeding further.

2. Operation

A. VHF and HF systems provide for communications between aircraft and ground stations and from aircraft to aircraft. Flitefone systems provide for communications from aircraft to ground using UHF frequencies (or HF frequencies if so equipped).

VHF COMMUNICATION - DESCRIPTION AND OPERATION

1. Description

NOTE: The dual VHF system may utilize the VHF20A or VHF20B in any combination for COMM 1 and COMM 2.

A. Collins VHF20A/VHF20B
   (1) The dual VHF system provides for VHF airborne communication for COMM 1 (VHF20A) in the frequency range from 117.000 MHz to 135.975 MHz and COMM 2 (VHF20B) in the frequency range from 116.000 MHz to 151.975 MHz.
   (2) The COMM 1 (VHF20A) system consists of a transceiver, antenna, and control head.
      (a) The transceiver is mounted in the nose compartment.
      (b) The antenna is mounted on top of the fuselage at frame 17 or frame 14.
      (c) The control head is located on the center instrument panel.
   (3) The COMM 2 (VHF20B) system consists of a transceiver, antenna, and a control head.
      (a) The transceiver is mounted in the nose compartment.
      (b) The antenna is mounted on the bottom of the fuselage at frame 27 or frame 17.
      (c) The control head is located on the center instrument panel.
   (4) The transceivers are completely solid-state and contain automatic carrier-to-noise and carrier-override squelch circuits. A modulator compression circuit prevents transmitter over-modulation.
   (5) The received VHF information is routed through the pilot's or copilot's audio control panel for audible control.

B. Wulfsberg WT200, Triple VHF System
   (1) The triple VHF system provides for VHF airborne communication.
   (2) The triple VHF system utilizes three separate systems. Two systems make up COMM 1A and COMM 1B, and the third system makes up COMM 2.
   (3) COMM 2 is used as a secondary system and as the emergency system in the event of electrical power loss on the aircraft.
   (4) COMM 1A and COMM 1B utilize the same antenna, located on the top of the fuselage at frame 17 or frame 14.
   (5) The COMM 2 antenna is located on the bottom of the fuselage at frame 27 or frame 17.

(6) The three VHF transceivers are mounted in racks located in the nose compartment.

(7) Frequency range of each transceiver is from 118.00 MHz to 135.975 MHz in 25 KHz increments.

(8) Control heads for COMM 1A, COMM 1B, and COMM 2 are located on the center instrument panel.

2. Operation

A. The operation of each VHF system is the same.

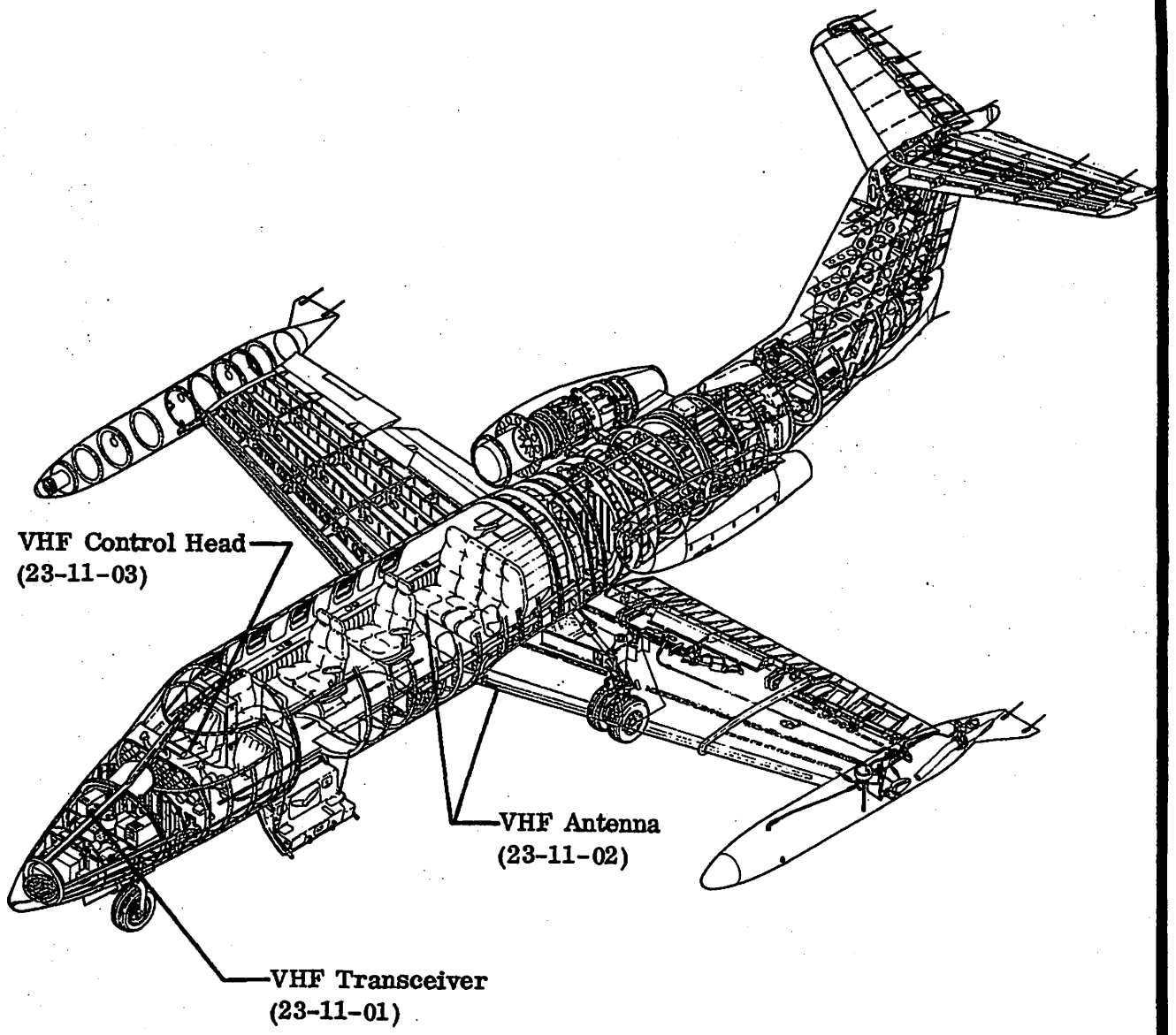
(1) Select the frequency on the VHF control head to be used for communication.

(2) The selected transceiver will receive all communications transmitted within its range on the selected frequency.

(3) The received signal is picked up by the VHF antenna and routed to the transceiver, which will filter the audible communication from the carrier signal. The audible signal is then amplified and sent to the audio control panel where it is directed to the speakers or headphones.

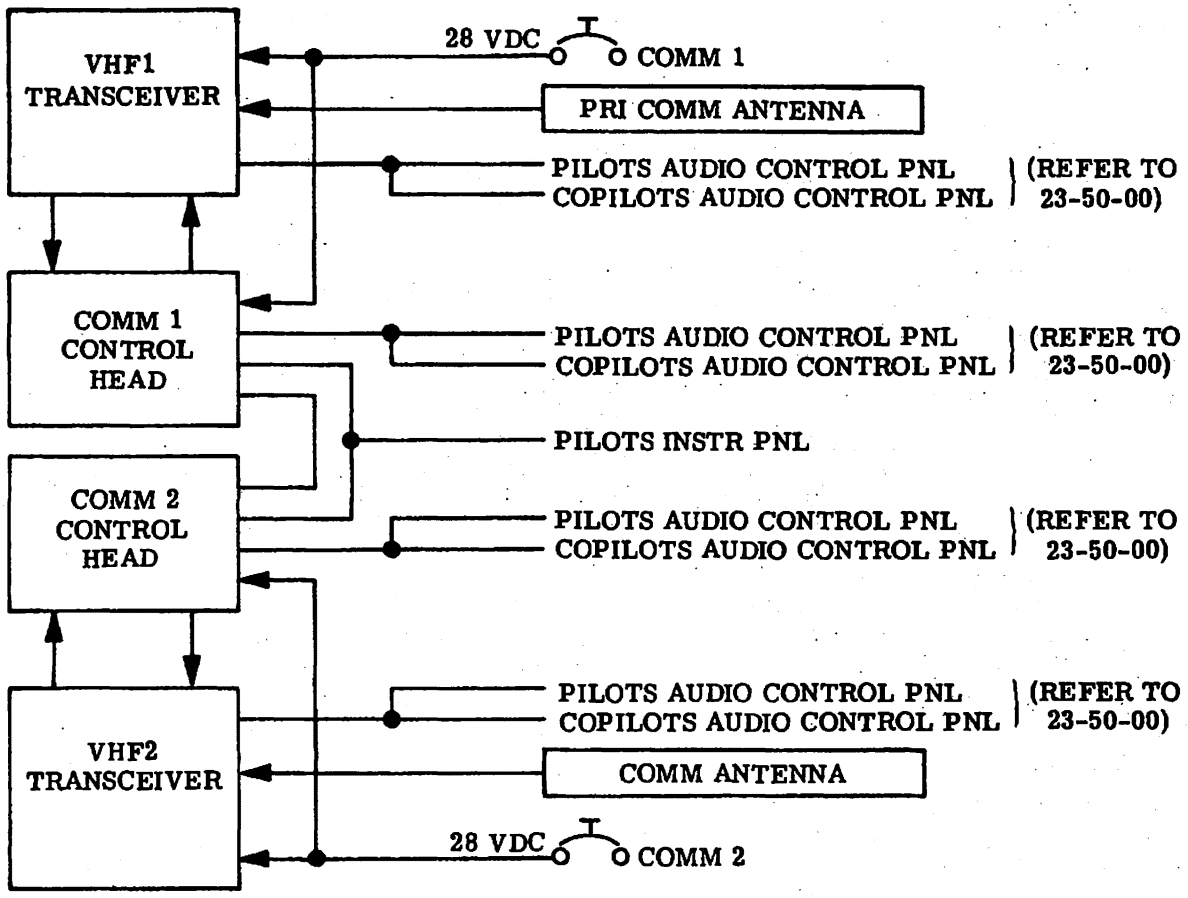
(4) To transmit, the operator speaks into the keyed microphone which will modulate the carrier frequency being transmitted by the transceiver.

(5) The carrier frequency is the frequency selected on the control head.



VHF Communications Equipment Locator
Figure 1

EFFECTIVITY: OPTIONAL



VHF Communications Block Diagram
Figure 1

VHF COMMUNICATION - MAINTENANCE PRACTICES

1. Inspection/Check

A. Operational Check (Dual Collins 20A/20B VHF System) (See figures 201 and 202.)

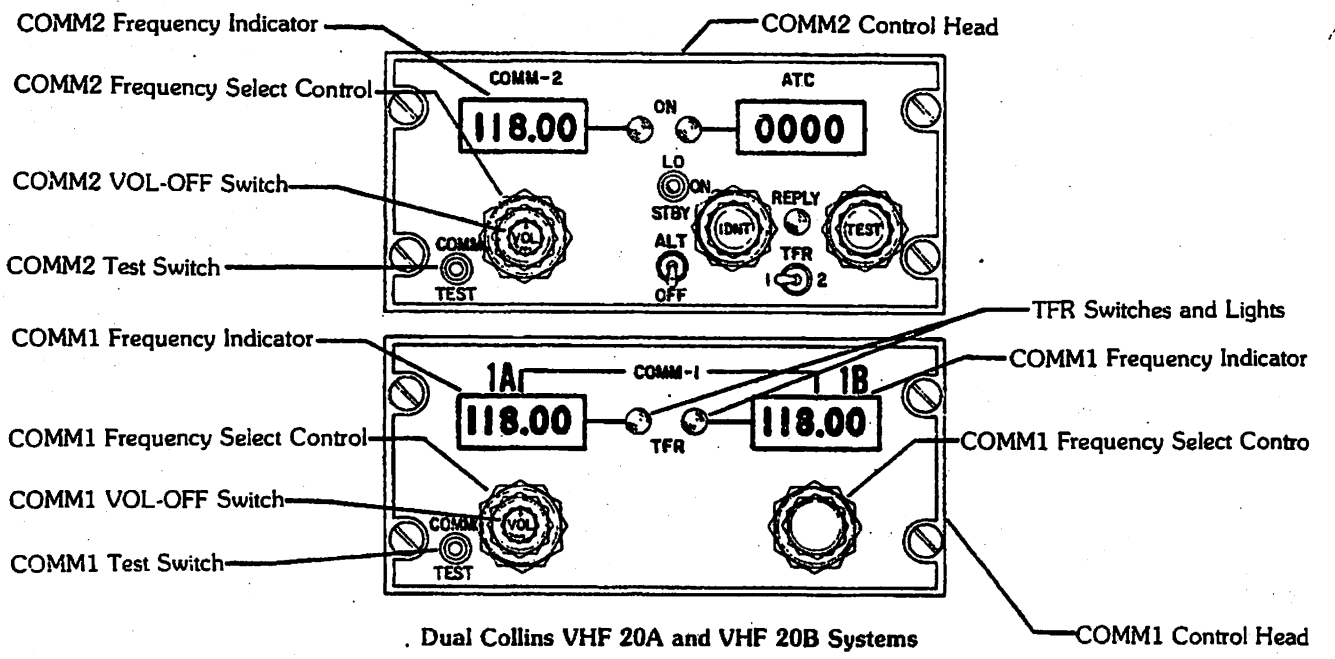
NOTE: The operation of dual Collins 20A/20B BHF system is the same for each system.

(1) Apply electrical power to aircraft.
(2) Depress COMM 1 and/or COMM 2 circuit breaker located on pilot's and/or copilot's circuit breaker panel.
(3) Turn VOL-OFF Switch on control head CW until it clicks. Further rotation of switch adjusts transmit volume.
(4) Set Frequency Select Control on control head to desired frequency.
(5) On pilot's or copilot's audio control panel, set Microphone Function Selector to desired VHF system and set VHF1-OFF and/or VHF2-OFF Switch to either VHF1 or VHF2. Then set SPKR/PHONE-PHONE-EMERGENCY Switch to PHONE.
(6) Push COMM TEST Switch on control head and listen for noise on headset as transceiver squelch circuit is overridden and noise is applied to aircraft audio system.
(7) Adjust MASTER VOL control on audio control panel to desired audio level.
(8) Key microphone and obtain communication check with selected local station.

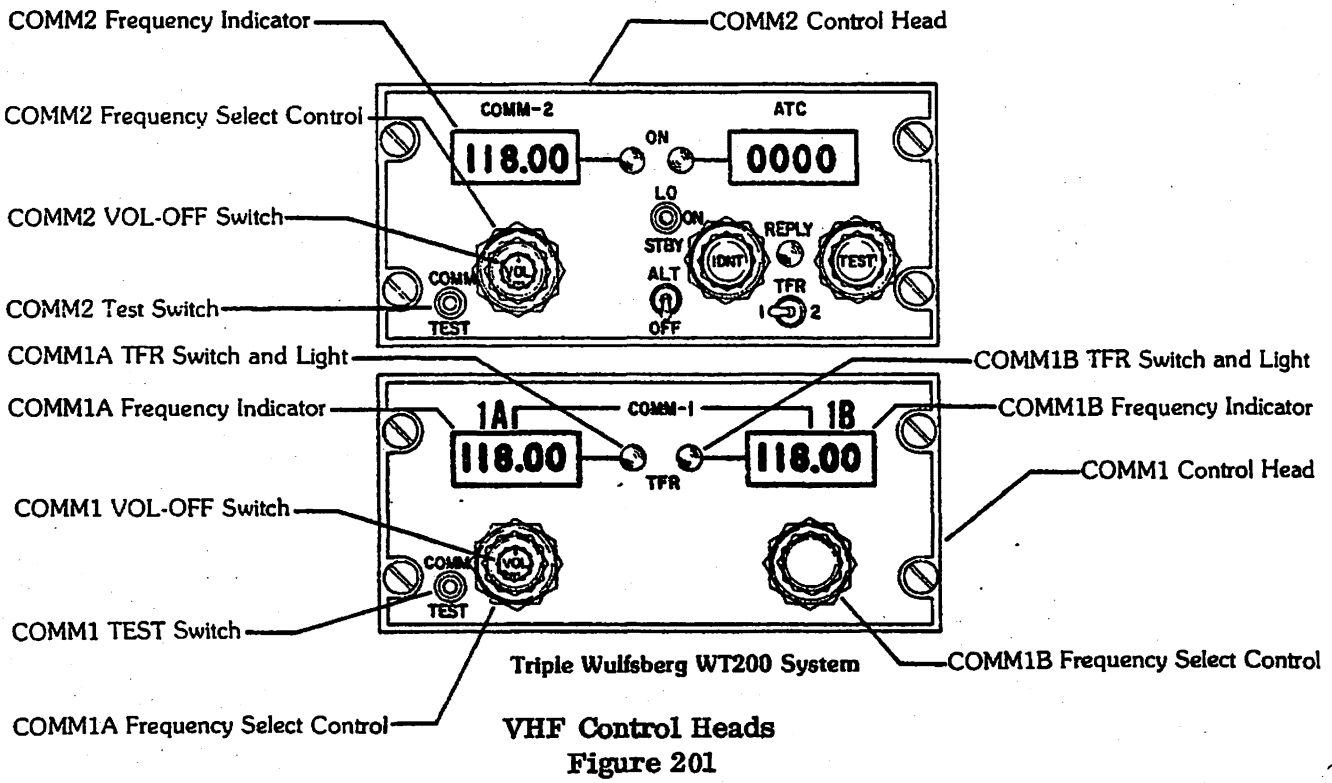
NOTE:
- The VHF communication range is generally termed as line of sight within a maximum range of 200 miles.
- Aircraft altitude affects line-of-sight range as follows: At 10,000 feet, range is approximately 100 miles. The 200-mile range or maximum range occurs at 30,000 feet and above.
- Communication range while aircraft is on ground will vary drastically due to interference from buildings and other objects.

B. Operational Check (Triple Wulfsberg WT200 VHF System) (See figures 201 and 202.)

(1) Apply electrical power to aircraft.
(2) Obtain two local VHF test frequencies from tower or test facility; set COMM 1A Frequency Select Control to highest test frequency and set COMM 1B Frequency Select Control to lowest test frequency.



. Dual Collins VHF 20A and VHF 20B Systems



Triple Wulfsberg WT200 System

VHF Control Heads
Figure 201

(3) Assure that COMM 1A circuit breaker located on pilot's circuit breaker is depressed.

(4) Assure that COMM 1B, COMM 2, and COMM 2 A/C BAT circuit breakers located on copilot's circuit breaker panel are depressed.

(5) On COMM 1A, COMM 1B, and COMM 2 control heads, rotate VOL-OFF Switches CW until they click. Further rotation adjusts transmit volume.

(6) On pilot or copilot's audio control panel, set Microphone Function Selector to VHF1, VHF1-OFF Switch to VHF1, and SPKR/PHONE-PHONE-EMERGENCY Switch to PHONE.

(7) Depress COMM 1 TEST Switch on control head and listen for noise on headset as transceiver squelch circuit is overridden and noise is applied to aircraft audio system.

(8) Adjust MASTER VOL control on audio control panel to desired audio level.

(9) Depress COMM 1A TFR Switch on COMM 1 control head. COMM 1A TFR light shall illuminate.

(10) Make contact with local tower or test facility and verify frequency setting and transceiver operation.

(11) Depress COMM 1B TFR Switch on COMM 1 control head. COMM 1B TFR light shall illuminate.

(12) Make contact with local tower or test facility and verify frequency setting and transceiver operation.

(13) Set COMM 2 Frequency Select Control to highest test frequency obtained.

(14) On pilot's and copilot's audio control panels set Selector Switch to VHF2, VHF2-OFF Switch to VHF2, and VHF1-OFF Switch to OFF.

(15) Make contact with local tower or test facility and verify frequency setting and transceiver operation.

(16) Set EMER BAT 2 ON-OFF Switch, located on pilot's instrument panel, to ON. Emergency power light located on pilot's instrument panel shall illuminate.

(17) Remove electrical power from aircraft.

(18) Set pilot's and copilot's audio control panel SPKR/PHONE-PHONE-EMERGENCY Switches to EMERGENCY.

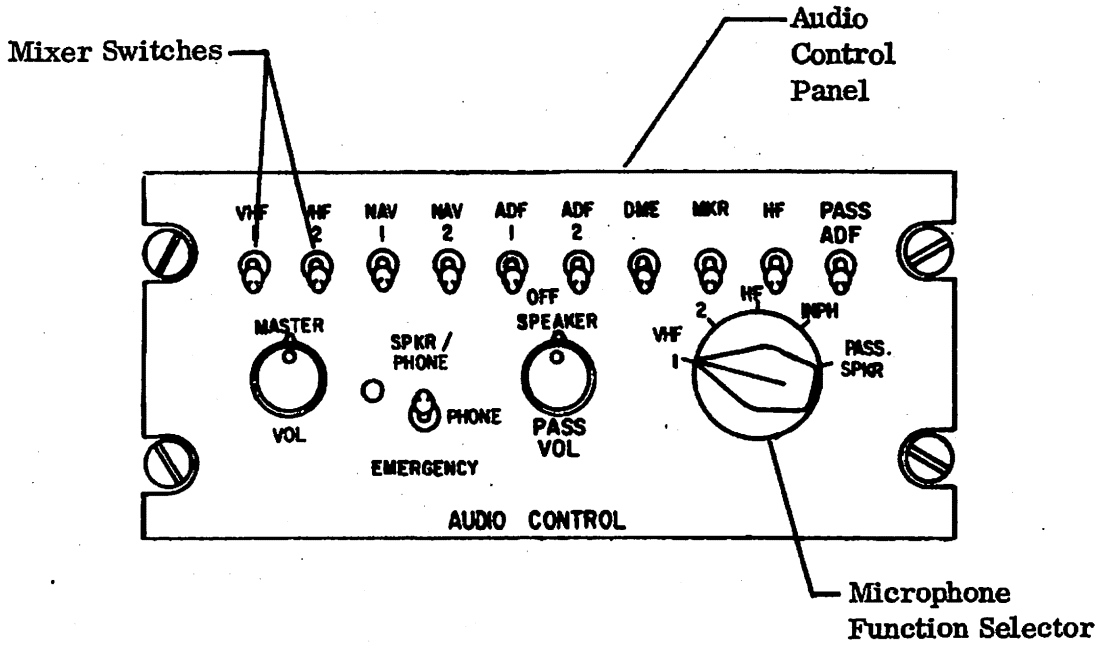
(19) Make contact with local tower or test facility and verify frequency setting and transceiver operation on emergency power.

(20) Set EMER BAT 2 ON-OFF Switch to OFF. Emergency power light shall extinguish.

(21) Set pilot's and copilot's audio control panel SPKR/PHONE-PHONE-EMERGENCY Switches to PHONE, VHF2-OFF Switches to OFF, and VHF1-OFF Switches to VHF1.

(22) Apply electrical power to aircraft.

(23) Depress COMM 1A TFR Switch. COMM 1A TFR light shall illuminate.
(24) Pull COMM 1A circuit breaker. COMM 1A TFR light shall extinguish, and COMM 1B TFR light shall illuminate.
(25) Contact local tower or test facility and verify that contact is made on COMM 1B frequency setting.
(26) Depress COMM 1A circuit breaker.
(27) Depress COMM 1B TFR Switch. COMM 1B TFR light shall illuminate.
(28) Pull COMM 1B circuit breaker. COMM 1B light shall extinguish and COMM 1A TFR light shall illuminate.
(29) Contact local tower or test facility and verify that contact is made on COMM 1A frequency setting.
(30) Rotate COMM 1A, COMM 1B, and COMM 2 VOL-OFF Switches to OFF.
(31) Remove electrical power from aircraft.



Audio Control Panel
Figure 202

VHF TRANSCEIVER - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Transceiver (Collins VHF20A/VHF20B) (See figure 201.)

(1) Remove electrical power from aircraft.

(2) Remove RH nose compartment access door.

CAUTION: DO NOT SHAKE SIDEWAYS OR TWIST TRANSCEIVER WHILE REMOVING FROM MOUNT RACK AS DAMAGE TO MATING CONNECTORS CAN RESULT.

(3) Loosen hold-down nuts securing transceiver in mounting rack.

(4) Pull transceiver straight out of mounting rack.

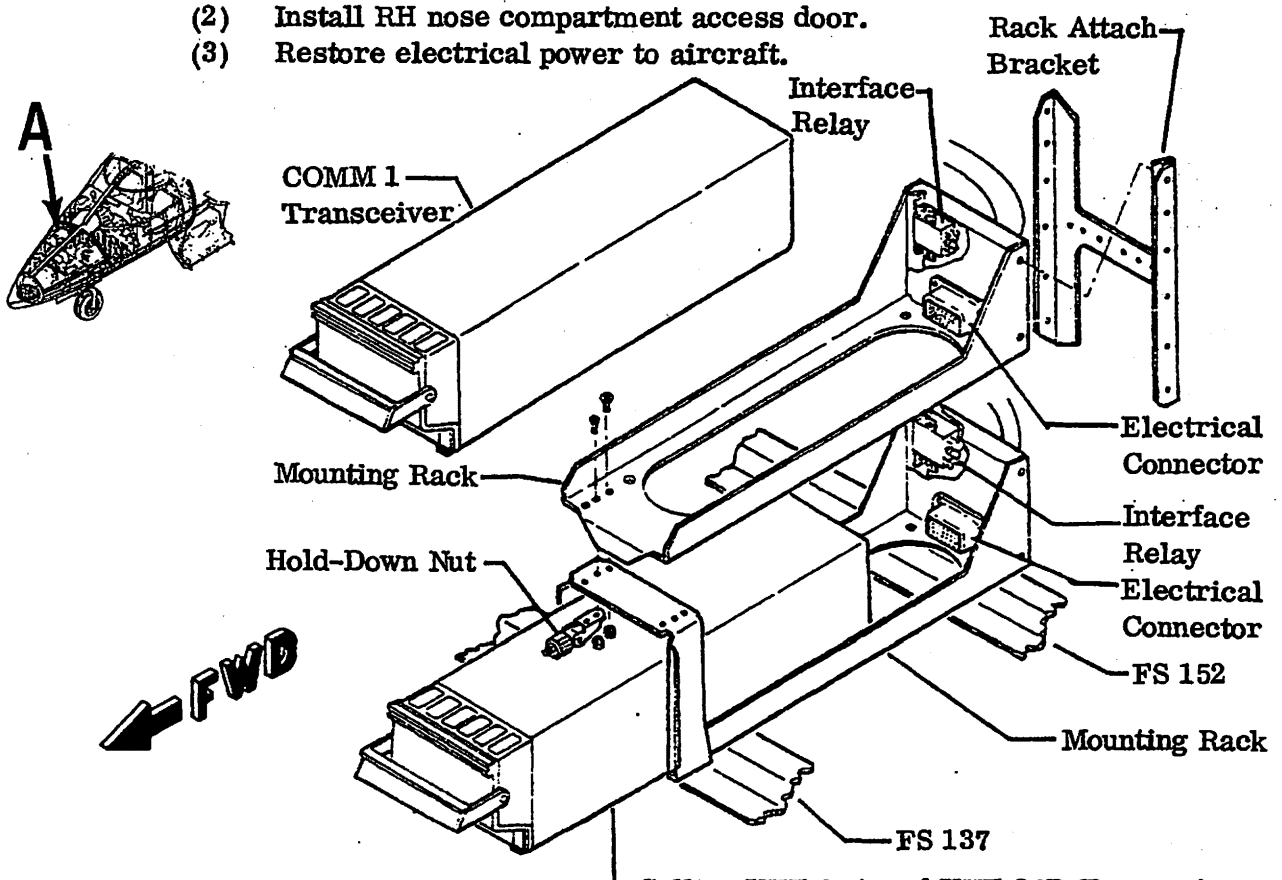
B. Install Transceiver (Collins VHF20A/VHF20B) (See figure 201.)

NOTE: Inspect transceiver and mounting rack electrical connectors for damaged, tarnished, or bent pins and sockets before installation.

(1) Install transceiver in mounting rack and secure with hold-down nuts.

(2) Install RH nose compartment access door.

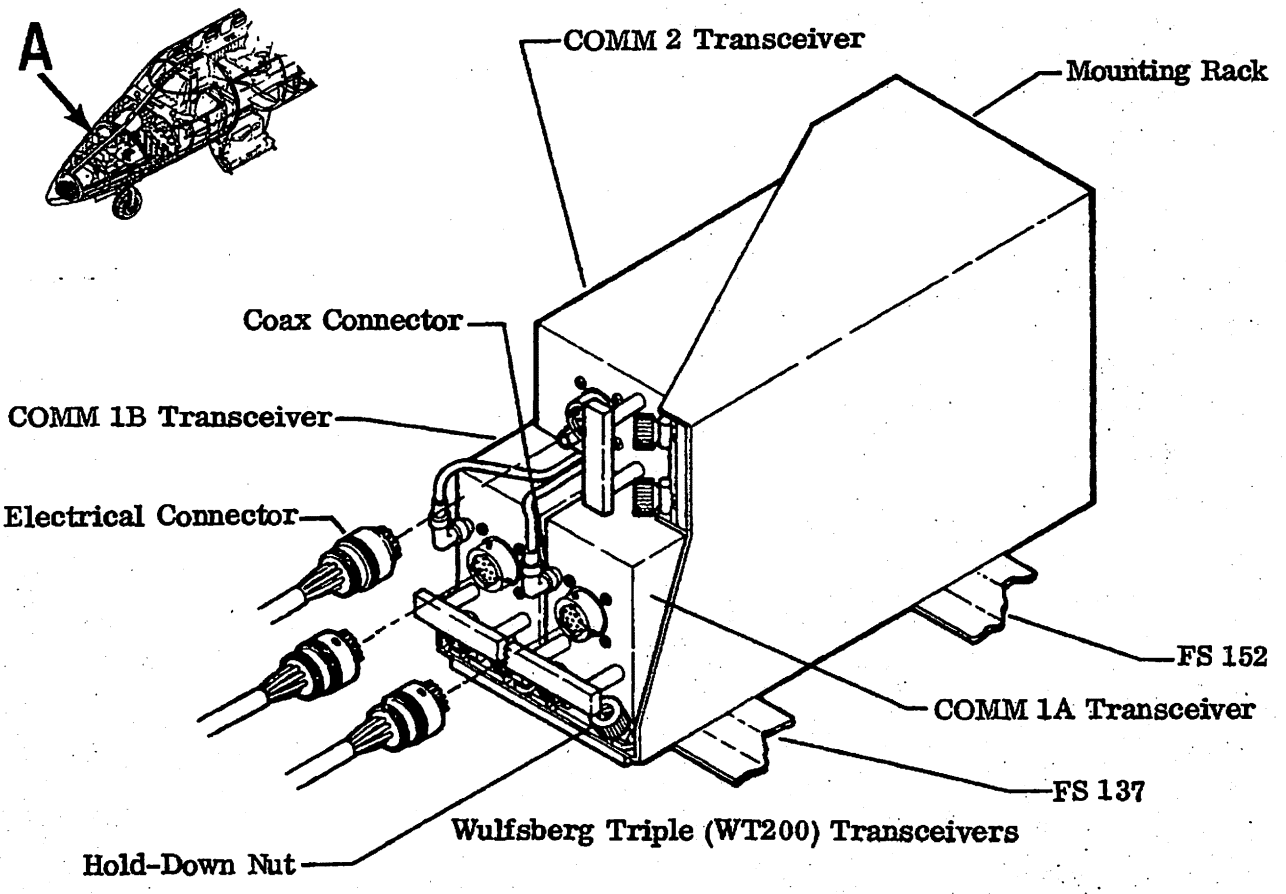
(3) Restore electrical power to aircraft.



VHF Transceiver and Rack Installation
Figure 201

C. Remove Transceiver (Wulfsberg WT200) (See figure 202.)
   (1) Remove electrical power from aircraft.
   (2) Remove RH nose compartment access door.
   (3) Disconnect antenna coax connector from transceiver.
   (4) Disconnect electrical connector from transceiver.
   (5) Loosen hold-down nuts and remove transceiver from mounting rack.

D. Install Transceiver (Wulfsberg WT200) (See figure 202.)
   (1) Install transceiver in mounting rack and secure with hold-down nuts.
   (2) Connect antenna coax connector to transceiver.
   (3) Connect electrical connector to transceiver.
   (4) Install RH nose compartment access door.
   (5) Restore electrical power to aircraft.



Detail A

VHF Transceiver and Rack Installation
Figure 202

VHF ANTENNA - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove VHF Antenna (Aircraft 25-061, 25-070 thru 25-226) (See figure 201.)

(1) Remove electrical power from aircraft.
(2) Remove items as necessary to gain access to base of antenna.
(3) Loosen nut and remove antenna rod.
(4) Disconnect coax cable from antenna.
(5) Cut sealant. Loosen and remove knurled nut from aircraft exterior.
(6) Remove antenna base and washers from aircraft.

B. Install VHF Antenna (Aircraft 25-061, 25-070 thru 25-226) (See figure 201.)

(1) Clean all traces of old sealant from fuselage skin.
(2) Install top of antenna base in hole in fuselage and secure with attaching parts.
(3) Install antenna rod, ensuring that it is aligned with aircraft centerline. Tighten antenna rod nut.
(4) Apply Pro-Seal 890 sealant around knurled nut. (Refer to Chapter 20.)
(5) Connect coax cable to antenna base.
(6) Install items previously removed to gain access to antenna.
(7) Restore electrical power to aircraft.

C. Remove VHF Antenna (Aircraft 25-227 and Subsequent) (See figure 201.)

(1) Remove electrical power from aircraft.
(2) Remove attaching parts securing antenna to fuselage.

CAUTION: USE CARE NOT TO DAMAGE AIRCRAFT SKIN WHEN REMOVING SEALANT.

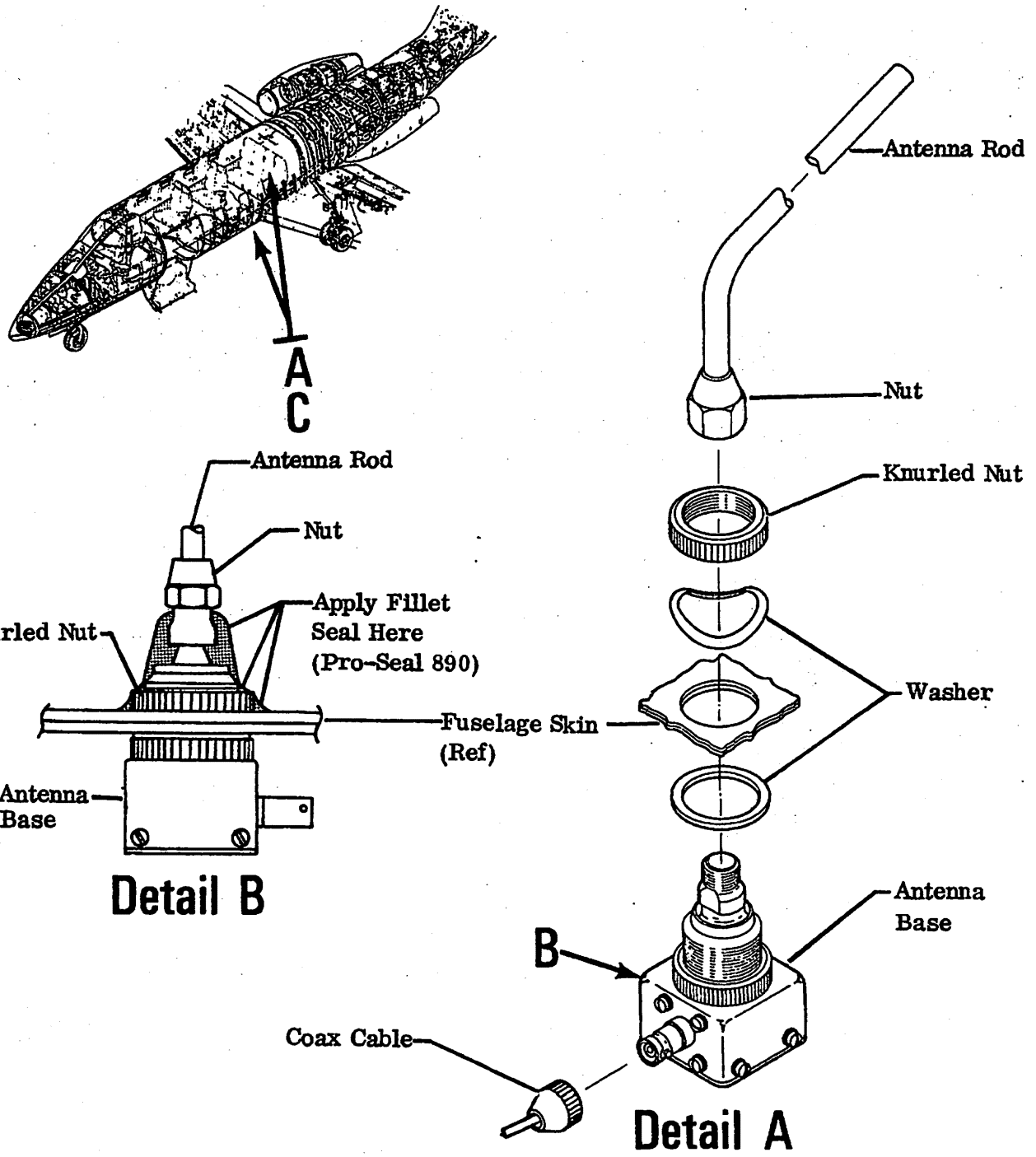
(3) Using caution, break sealant bond between antenna and fuselage.
(4) Pull antenna from fuselage and attach a length of string around the coax cable just behind the connector.
(5) Disconnect coax connector from antenna and secure loose end of string to keep coax connector from slipping back into fuselage.
(6) Remove antenna from aircraft area.

D. Install VHF Antenna (Aircraft 25-227 and Subsequent) (See figure 201.)

CAUTION: USE CARE NOT TO DAMAGE AIRCRAFT SKIN WHEN REMOVING SEALANT.

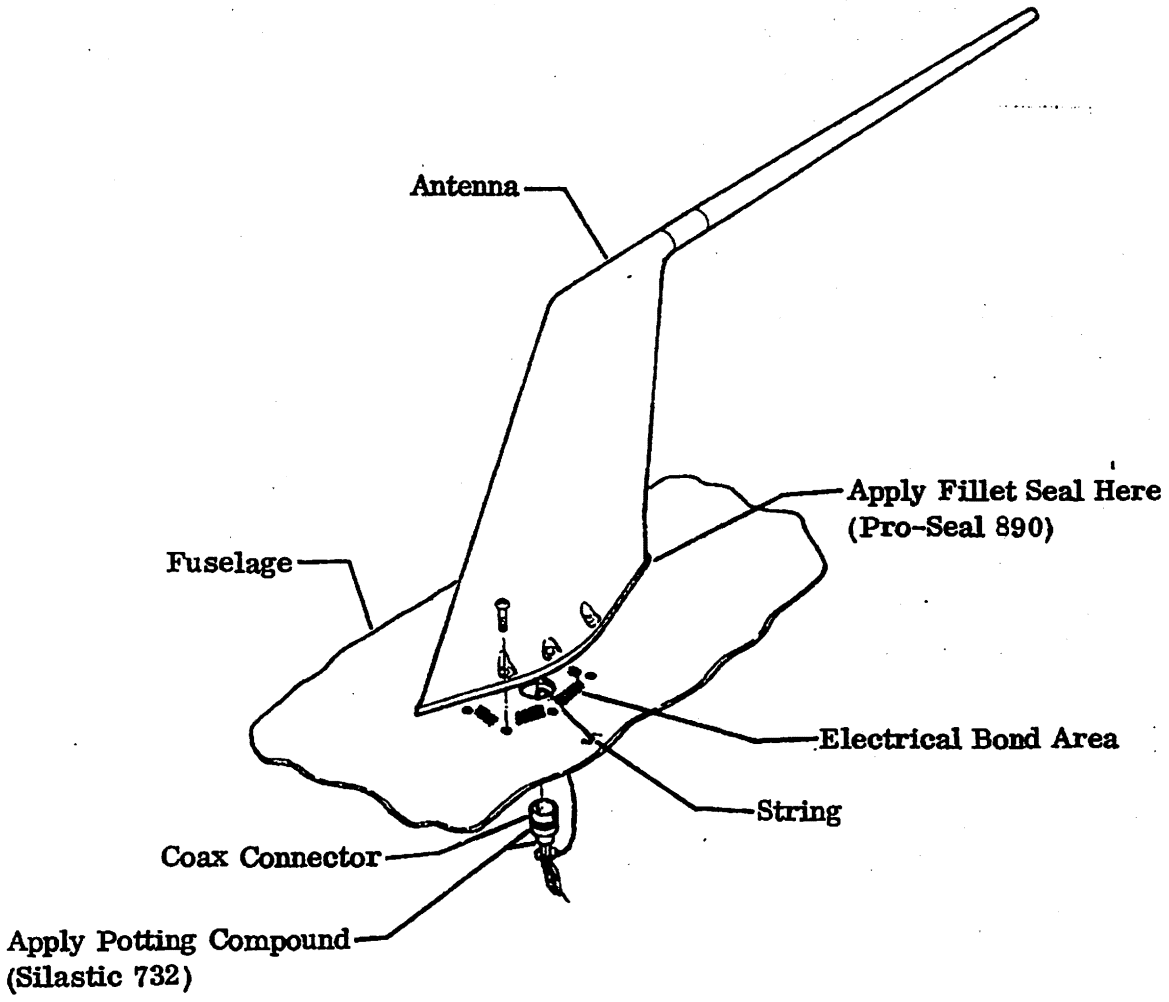
(1) Prepare antenna mounting surface and mounting area on fuselage for electrical bonding. (Refer to Chapter 20 of Wiring Manual.)
(2) Connect coax connector to antenna and remove string.
(3) Clean coax connector with N-BUTYL alcohol (TT-B-846).

(4) Cover entire area of coax connector with clear Silastic 732 potting compound.
(5) Attach antenna to fuselage with attaching screws.
(6) Clean antenna base and fuselage mating area with clean cloth and methyl-ethyl-ketone.
(7) Apply fillet seal (Pro-Seal 890) around entire base of antenna.
(8) Restore electrical power to aircraft.



Aircraft 25-061, 25-070 thru 25-226

VHF Antenna Installation
Figure 201 (Sheet 1 of 2)



Detail C

Aircraft 25-227 and Subsequent

VHF Antenna Installation
Figure 201 (Sheet 2 of 2)

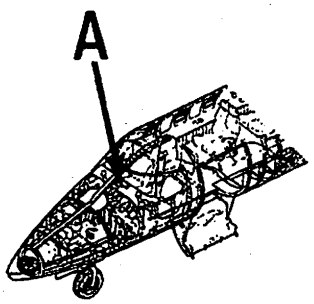
VHF CONTROL HEAD - MAINTENANCE PRACTICES

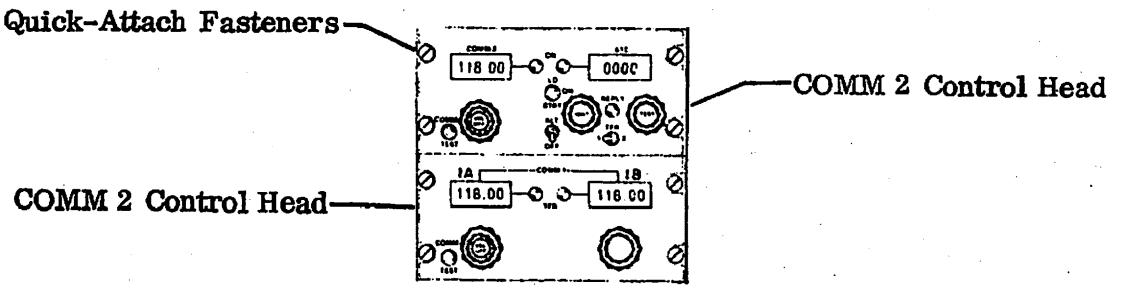
1. Removal/Installation

NOTE: Removal/Installation procedures for both heads are identical.

A. Remove COMM Control Head (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Release quick-attach fasteners on face of control head.
   (3) Pull control head out of instrument panel to gain access to electrical connectors.
   (4) Disconnect electrical connectors from control head.
   (5) Remove control head from aircraft.

B. Install COMM Control Head (See figure 201.)
   (1) Connect electrical connectors to control head.
   (2) Slide control head into position.
   (3) Fasten quick-attach fasteners.
   (4) Restore electrical power to aircraft.





Detail A

VHF Control Head Installation
Figure 201

HF COMMUNICATION - DESCRIPTION AND OPERATION

1. Description

A. Collins 718U-5M HF Communication System

(1) The HF communication system consists of a receiver/exciter, power amplifier-coupler, control panel, an antenna, and on Aircraft 25-205 and Subsequent, an audio adapter box. (See figure 1.)

(a) The receiver/exciter is located on the forward side of the aft pressure bulkhead.

(b) The power amplifier-coupler is located on the forward side of the aft pressure bulkhead.

(c) The antenna is suspended between the antenna support bracket, on the upper leading edge of vertical stabilizer, and the insulated feedthru, located on top of the fuselage at frame 18.

(d) The control panel is located on the aft portion of the pedestal.

(e) On Aircraft 25-205 and Subsequent, an audio adapter box is installed at frame 7 between stringers 11 and 12, adjacent to the copilot's seat.

(2) The HF control panel is used to remotely control and monitor the receive and transmit functions of the receiver/exciter by the following selectors and indicators. (See figure 2.)

(a) The Mode Select Switch selects the desired function mode.

(b) The five Frequency Select Switches may be operated in any order until the desired operating frequency is indicated.

(c) The Volume Control (VOL) is used to adjust for desired audio from the speaker. CW position equals maximum volume.

(d) The Squelch Control (SQL) is used to mute the undesired background noise.

(e) The Channel Select Switch provides for nine preset channels with half-duplex capability and one (MAN) position that is for simplex operation only.

(f) Preset control consists of the Preset Switch, LOAD Switch, and Channel Select Switch. These switches allow for front-panel programming of the preset channels.

(g) The three indicators on the HF control panel indicate the following:

1) The MODE indicator indicates the mode in which system is operating.

2) The MH_Z indicator indicates the frequency in which system is operating.

3) The CHAN indicator indicates the channel on which system is operating.

(h) The RF TEST lamp indicates operational status of the HF system.

B. Sunair ASB 500 HF Communication System

(1) The HF communication system consists of a transceiver, control panel, antenna and antenna coupler. (See figure 1.)

(a) The transceiver is located on the forward side of the aft pressure bulkhead.

(b) The antenna coupler is located on the forward side of the aft pressure bulkhead.

(c) The antenna is suspended between the antenna support bracket, on the upper leading edge of the vertical stabilizer, and the insulated feedthru, located on top of the fuselage.

(d) The control panel is located on the aft portion of the pedestal.

(2) The HF control panel is used to remotely control and monitor the receive and transmit functions of the transceiver by the following selectors and indicators. (See figure 2.)

(a) The Volume Control (VOLUME) is used to adjust for desired audio. Clockwise position equals maximum volume.

(b) The Frequency Selectors may be operated in any order until desired operating frequency is indicated.

(c) The Squelch Control (SQUELCH) is used to mute undesired background noise.

(d) The ON Switch controls electrical primary power to the HF system.

(e) The Mode Select Switches (LSB, AM, and USB) are used to select mode or modes for receiving and transmitting communications.

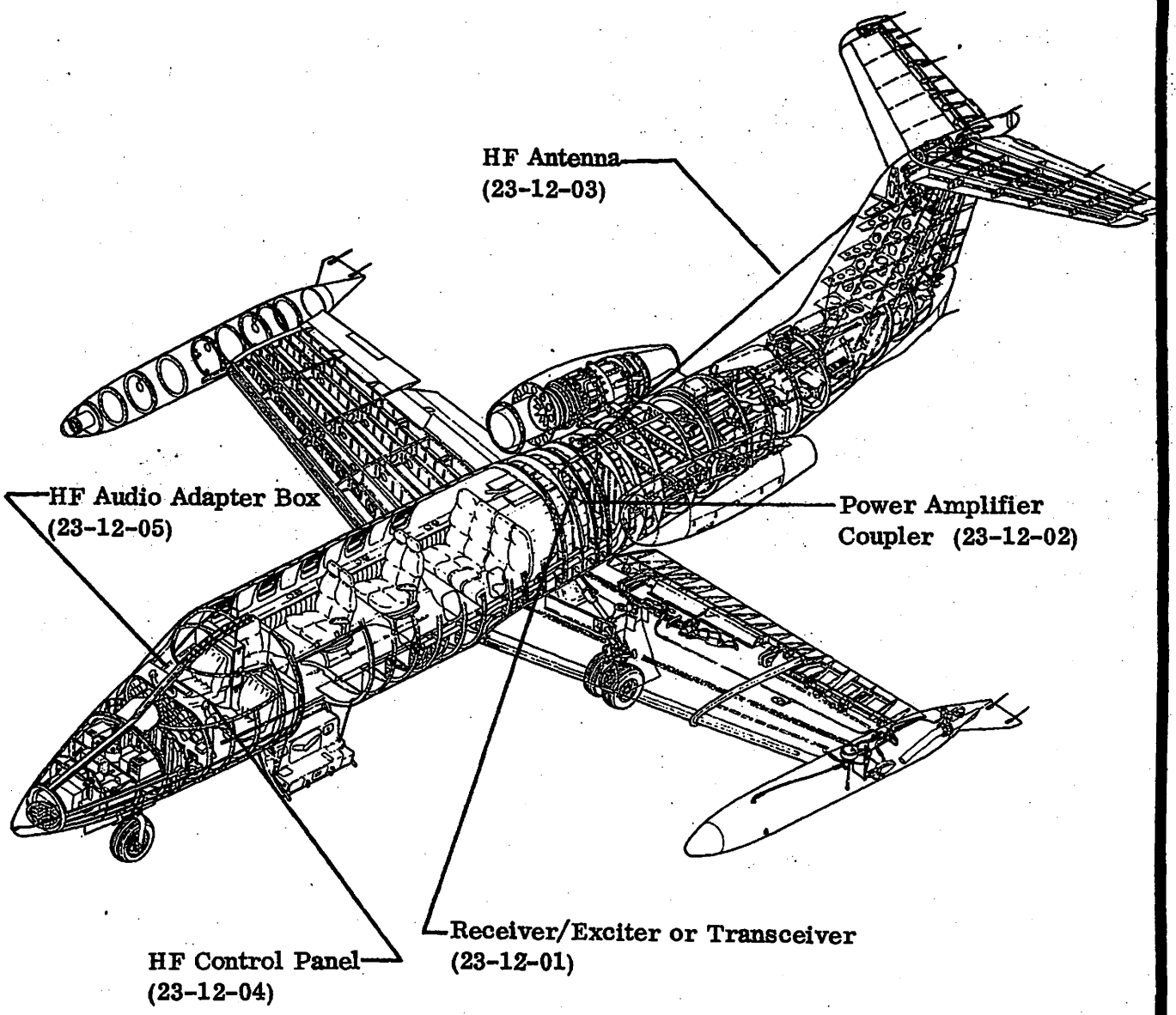
(f) When the Tune Switch (TUNE) is depressed, it starts the antenna coupler tuning cycle at the frequency selected.

(g) The Frequency Display displays the frequency selected by the Frequency Selectors.

NOTE: If a frequency below 2.00 MH_Z or above 17.999 MH_Z is selected, the transceiver is disabled and display flashes on and off.

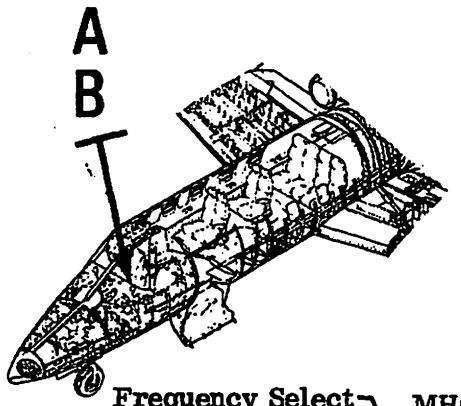
(h) The READY XMIT light (green) indicates the antenna is tuned and system is ready for use when in receive mode. When in transmit mode, it indicates transmitter RF output on modulation peaks.

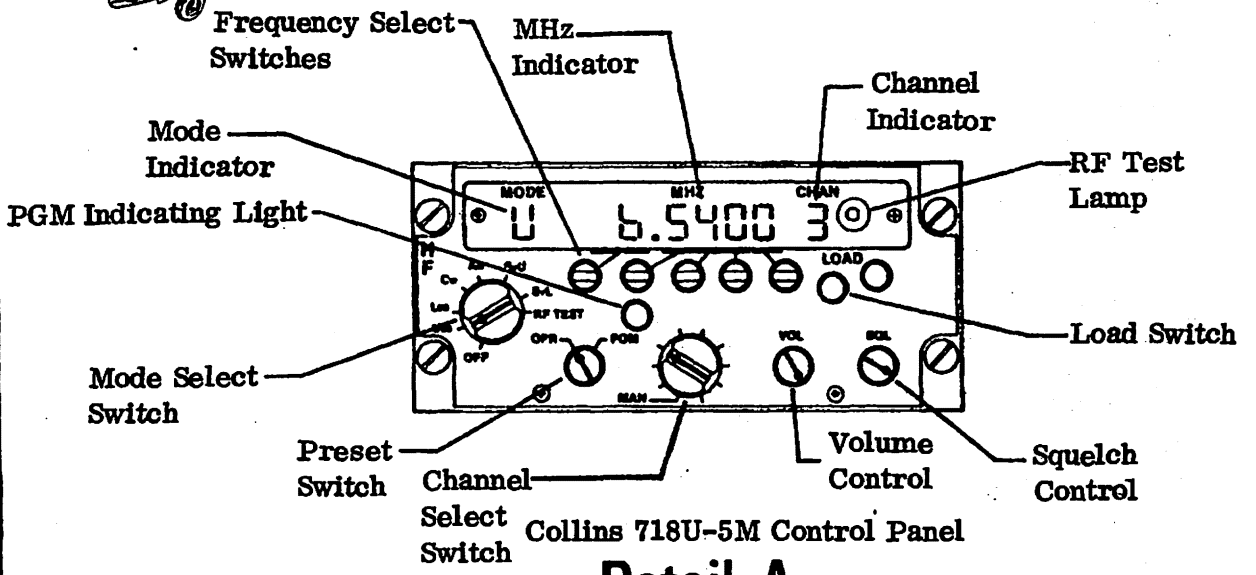
(i) The TUNE-FAULT light (amber) indicates a fault in the transmitting system, coupler, or antenna.



HF Communications Equipment Locator
Figure 1

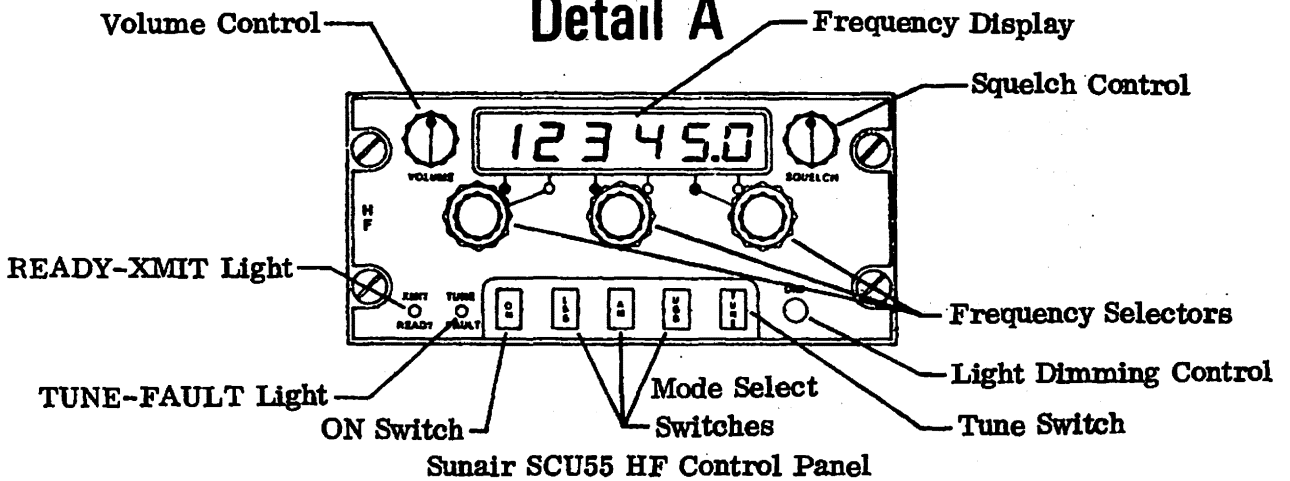
EFFECTIVITY: OPTIONAL





Collins 718U-5M Control Panel

Detail A



Sunair SCU55 HF Control Panel

Detail B

16-30A
16-29A

HF Communication Control Panels
Figure 2

2. Operation

A. Collins 718U-5M

(1) The HF communication system is capable of receiving continuously in all modes once power has been applied to the system. Transmitting is limited to 1.0 minute transmit and 3.0 minutes receive for SSB voice.

WARNING: STAND CLEAR AND DO NOT TOUCH THE ANTENNA OR ANTENNA FEEDLINE WHILE SYSTEM IS TRANSMITTING AS PAINFUL RF BURNS AND DEATH MAY RESULT FROM HIGH RF VOLTAGE.

(2) The HF system will perform as stated in the following modes.

(a) OFF mode. When the Mode Select Switch on the control panel is set to OFF, the HF system is turned off, independent of Channel Select Switch setting and control panel display, all controlled indicators will be extinguished and the transceiver will go on low power.

(b) MAN mode. With the Channel Select Switch set to MAN and the Mode Select Switch set to OFF, the HF system is turned off. The transceiver will respond to the Mode Select Switch setting, and the mode is displayed on the control panel. The operating frequency is selected with the Frequency Select Switches and is displayed by the frequency indicator on the control panel. If the Channel Selector Switch is set to a preset channel, the manual mode information is stored in memory and is recalled when the Channel Select Switch is returned to MAN.

(c) USB, LSB, or AM mode.

NOTE: The sequence is the same for USB (upper sideband), LSB (lower sideband), and AM (amplitude modulation).

Set the Frequency Select Switches to the desired operating frequency and rotate the SQL control CCW until the background nose is reduced to a low level or until the SQL control is rotated fully CCW. The receiver should mute after a short delay. Tune the system by depressing the MIC switch momentarily; the system will then tune automatically.

NOTE:
- A constant tone will be heard in the headset during the tune cycle.
- The tune cycle is approximately 3 seconds in duration.
- When the tune cycle is complete, the constant tone will disappear and receiver noise will be heard.

(d) VOL control. By rotating the VOL (volume) control CW or CCW, the audio can be adjusted to the desired level.

(3) To preset operation, perform the following:
- (a) Assure that the Mode Select Switch is in any position other than OFF.
- (b) Set OPR/PGM Switch to OPR.
- (c) Set Channel Select Switch to preset channel desired.

(4) To preset channel loading, perform the following:
- (a) Assure that Mode Select Switch is in any position other than OFF.
- (b) Set OPR/PGM Switch to PGM.
- (c) Set Channel Select Switch to channel desired.
- (d) For single frequency for both transmit and receive (simplex operation), set Mode Select Switch to desired mode and Frequency Select Switches to desired frequency.
- (e) Depress LOAD Switch on control panel.
- (f) For separate frequencies for transmit and receive (half duplex operation), perform steps 1 thru 5 to load the receive frequency. Hold MIC Switch closed while setting Frequency Select Switches to the desired transmit frequency. Depress the LOAD Switch; loading is now complete.

B. Sunair ASB 500 HF Communication System

(1) The HF communication system is capable of receiving continuously in all modes.

WARNING: STAND CLEAR AND DO NOT TOUCH THE ANTENNA OR ANTENNA FEEDLINE WHILE SYSTEM IS TRANSMITTING, AS PAINFUL RF BURNS AND DEATH MAY RESULT FROM HIGH RF VOLTAGE.

(2) The HF system will perform as stated in the following modes:
- (a) On the HF control panel, press the ON Switch. The ON light shall illuminate, the frequency display shall indicate the frequency to which the system is tuned, and the TUNE-FAULT light shall illuminate.
- (b) On pilot's or copilot's audio panel, set Selector Switch to HF.
- (c) On HF control panel, rotate Squelch Control and Volume Control fully CW. Audio noise will be present in aircraft speakers. Reduce volume to desired level.
- (d) Rotate Squelch Control fully CCW. The aircraft speakers will be silenced except when a strong signal is present. Rotate Squelch Control to mid-range.

(e) Adjust Light Dimming Control on HF control panel. The control panel lamps and frequency display shall vary in intensity.

(f) Set Frequency Selectors to a local ground station frequency, then depress the desired Mode Select Switch and depress the TUNE Switch. The TUNE-FAULT or READY light shall not illuminate, and the TUNE light shall remain illuminated during the antenna coupler tune cycle. The TUNE light shall extinguish, the READY light shall illuminate, and audio noise should be heard from aircraft speakers when the tune cycle is complete.

(g) Make contact with ground station and request a radio check. The READY light shall extinguish when transceiver is keyed but shall illuminate when operator speaks into microphone (starts modulating transmitter).

(h) Using the Frequency Selector, select and depress TUNE Switch. The antenna coupler shall tune all frequencies selected.

(i) Verify frequency settings with ground station.

(j) Depress ON Switch on the HF control panel. The ON light shall extinguish and power shall be removed from the HF system.

HF COMMUNICATION - MAINTENANCE PRACTICES

1. Inspection/Check

A. Collins 718U-5M HF Communication

(1) The following information contains possible malfunctions and checks for the system.

(a) Tuning Fault. A tuning fault is indicated by a beeping sound on the headset approximately 8 seconds after the tuning cycle is initiated. Initiate a new tune cycle either by turning the Mode Selector to OFF and back to the operating mode, or by changing any Frequency Selector away from and back to the operating frequency. Key the system and the tune tone shall be present for approximately 3 to 6 seconds and then disappear. If the beeping sound recurs, try clearing procedure a second time. If the fault is still indicated, a unit failure is probable.

(b) Receive Check. To check the receive portion of the HF receiver/exciter, perform the following:

1) Rotate the SQL control fully CCW and tune the HF system to WWV.
2) Set Mode Select Switch to USB.
3) Set Frequency Select Switches to 20.7010 MHz. A 1-KHz tone will be detected.
4) Set Mode Select Switch to LSB.
5) Set Frequency Select Switches to 20.6990 MHz. If a 1-KHz tone is heard, the system is operational.

(c) RF Test Lamp Check. With power on system, set Mode Select Switch to RF TEST. Do not key system. Observe RF TEST lamp for following indications:

1) RF TEST lamp does not illuminate. This indicates the lamp is defective or the receiver/exciter is faulty.
2) RF TEST lamp blinks for more than 1 minute. This indicates the receiver/exciter is faulty.
3) RF TEST lamp illuminates immediately or after an initial period of blinking. This indicates the RF TEST lamp and fault circuits are operational.

(d) Tune Check.

1) With power on system, set Mode Select Switch to RF TEST.
2) Set Frequency Select Switches to a random frequency and key system momentarily.

NOTE:
- Nominal tune time of power amplifier-coupler (pa-coupler) is approximately 5 seconds after system has been keyed.
- RF TEST lamp indications in this test are only valid for approximately 5 seconds after system has been keyed.

3) Observe RF TEST lamp during tune cycle while tune tone is audible. Normal tune time is 3 to 8 seconds.
4) If no tune tone is heard after system has been keyed, the fault is in either the MIC switch, receiver/exciter, or the exciter tune circuit between the receiver/exciter and the power amplifier coupler.
5) Should RF TEST lamp stay illuminated continuously, the fault is in the receiver/exciter.
6) Should RF TEST lamp blink on and off, the power amplifier coupler is faulty.
7) Should system remain keyed and tune tone does not stop after 15 seconds, determine which unit is faulty by disconnecting connector J1 from the power amplifier coupler front panel. If tone drops and a beeping tone is heard, the power amplifier is faulty. If tune tone persists, the receiver/exciter or receiver/exciter mount is faulty.
8) If test lamp is out, tune tone drops, and a beeping tone is heard at end of tuning cycle, the power amplifier coupler mount failed to tune antenna.
9) Should RF TEST lamp be extinguished, set Mode Select Switch to USB, key and talk into MIC, and keep MIC keyed. If sidetone is not heard, check interphone system before replacing receiver/exciter.

NOTE: Presence of a sidetone indicates system is working.

B. Sunair ASB 500 HF Communication

(1) Apply power to HF communication system. The TUNE-FAULT light on the HF control panel shall illuminate RED, indicating a fault.
(2) Set Frequency Selectors on HF control panel to desired frequency and depress the TUNE Switch. The TUNE-FAULT light shall extinguish and the XMIT-READY light, shall illuminate, indicating the HF system is tuned and ready for operation.
(3) Should the TUNE-FAULT light illuminate during operation, it indicates the antenna has become untuned. Depress the TUNE Switch; the HF system shall retune to selected frequency, and the XMIT-READY light shall illuminate, indicating system is ready for operation.

RECEIVER/EXCITER OR TRANSCEIVER - MAINTENANCE PRACTICES

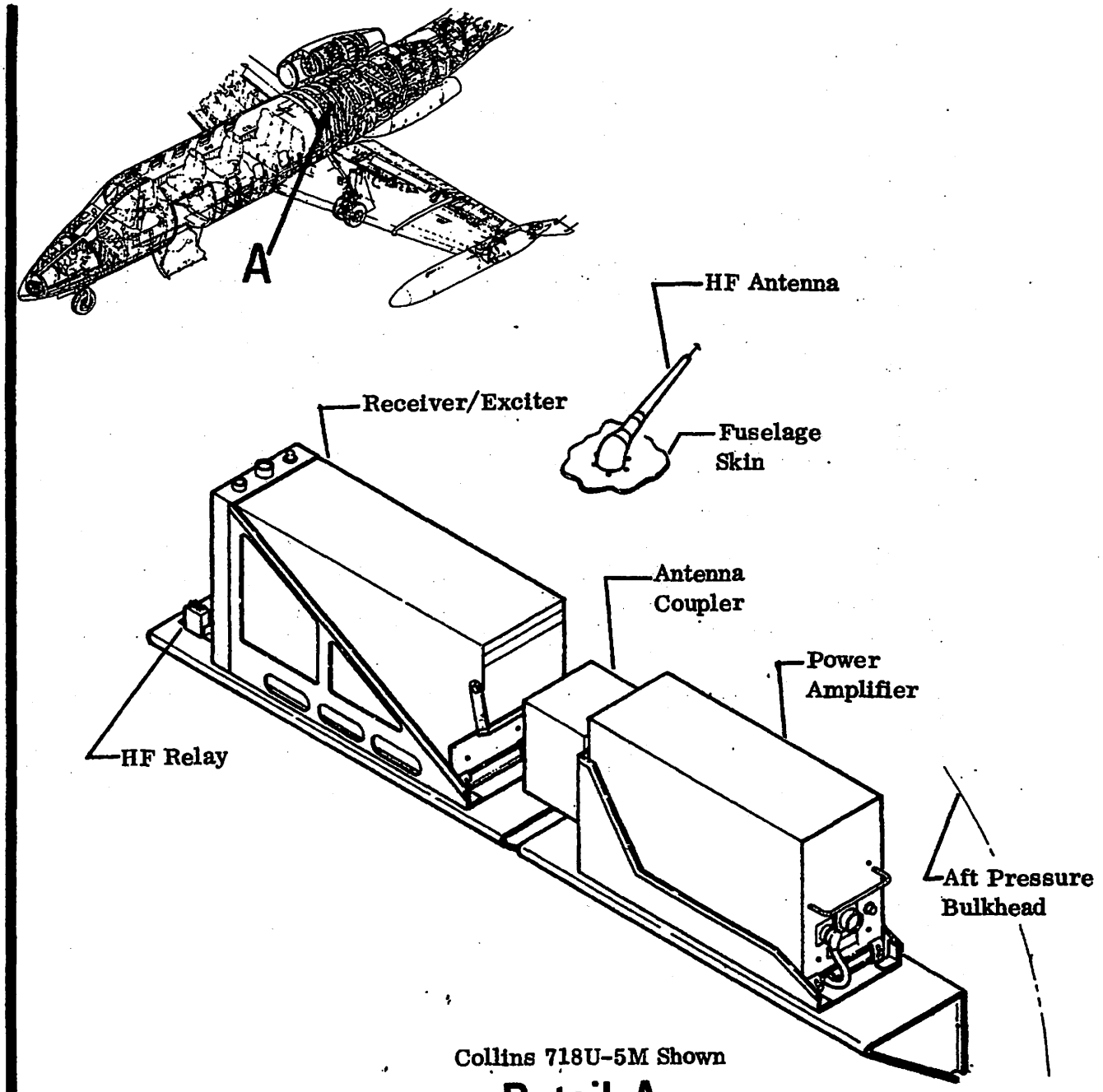
1. Removal/Installation

A. Remove Collins 718U-5M Receiver/Exciter (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Remove necessary equipment to gain access to aft pressure bulkhead.
   (3) Disconnect electrical connectors from receiver/exciter.
   (4) Loosen attaching parts and remove receiver/exciter from mount rack and aircraft.

B. Install Collins 718U-5M Receiver/Exciter (See figure 201.)
   (1) Install receiver/exciter in mount rack and secure with attaching parts and safety wire.
   (2) Connect electrical connectors to receiver/exciter.
   (3) Install previously removed equipment.
   (4) Restore electrical power to aircraft.

C. Remove Sunair ASB500 Transceiver (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Remove necessary equipment to gain access to aft pressure bulkhead.
   (3) Disconnect electrical and coax connectors from transceiver.
   (4) Cut safety wire and loosen hold-down nuts.
   (5) Remove transceiver from mounting rack and aircraft.

D. Install Sunair ASB500 Transceiver (See figure 201.)
   (1) Install transceiver in mounting rack and secure with attaching parts.
   (2) Connect electrical and coax connectors to transceiver.
   (3) Install previously removed equipment and secure with attaching parts and safety wire.
   (4) Restore electrical power to aircraft.



Collins 718U-5M Shown

Detail A

Receiver/Exciter Installation (Typical)
Figure 201

POWER AMPLIFIER-COUPLER - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Power Amplifier (Collins 718U-5M) (See figure 201.)

WARNING: DO NOT TOUCH OUTPUT WIRE OR ANTENNA WHILE SYSTEM IS TRANSMITTING, AS PAINFUL RF BURNS OR DEATH COULD RESULT.

(1) Remove electrical power from aircraft.
(2) Remove equipment as required to gain access to aft pressure bulkhead.
(3) Remove HF cover, located on aft pressure bulkhead in upper LH corner. The cover is secured with Velcro pile tape.
(4) Disconnect electrical connectors from power amplifier.
(5) Loosen attaching parts and remove power amplifier from mounting rack and aircraft.

B. Install Power Amplifier (Collins 718U-5M) (See figure 201.)
(1) Install power amplifier in mounting rack and secure with attaching parts.
(2) Connect electrical connectors to power amplifier.
(3) Install HF cover, assuring that Velcro pile tape is firmly meshed.
(4) Install all equipment that was removed to gain access to aft pressure bulkhead.
(5) Restore electrical power to aircraft.

C. Remove Antenna Coupler (Collins 718U-5M) (See figure 201.)
(1) Remove power amplifier as stated in steps A (1) through A (5).
(2) Remove screws attaching coupler to rack.
(3) Loosen knurl nut on coupler and remove wire interconnecting coupler and antenna.
(4) Remove attaching parts and antenna coupler from aircraft.

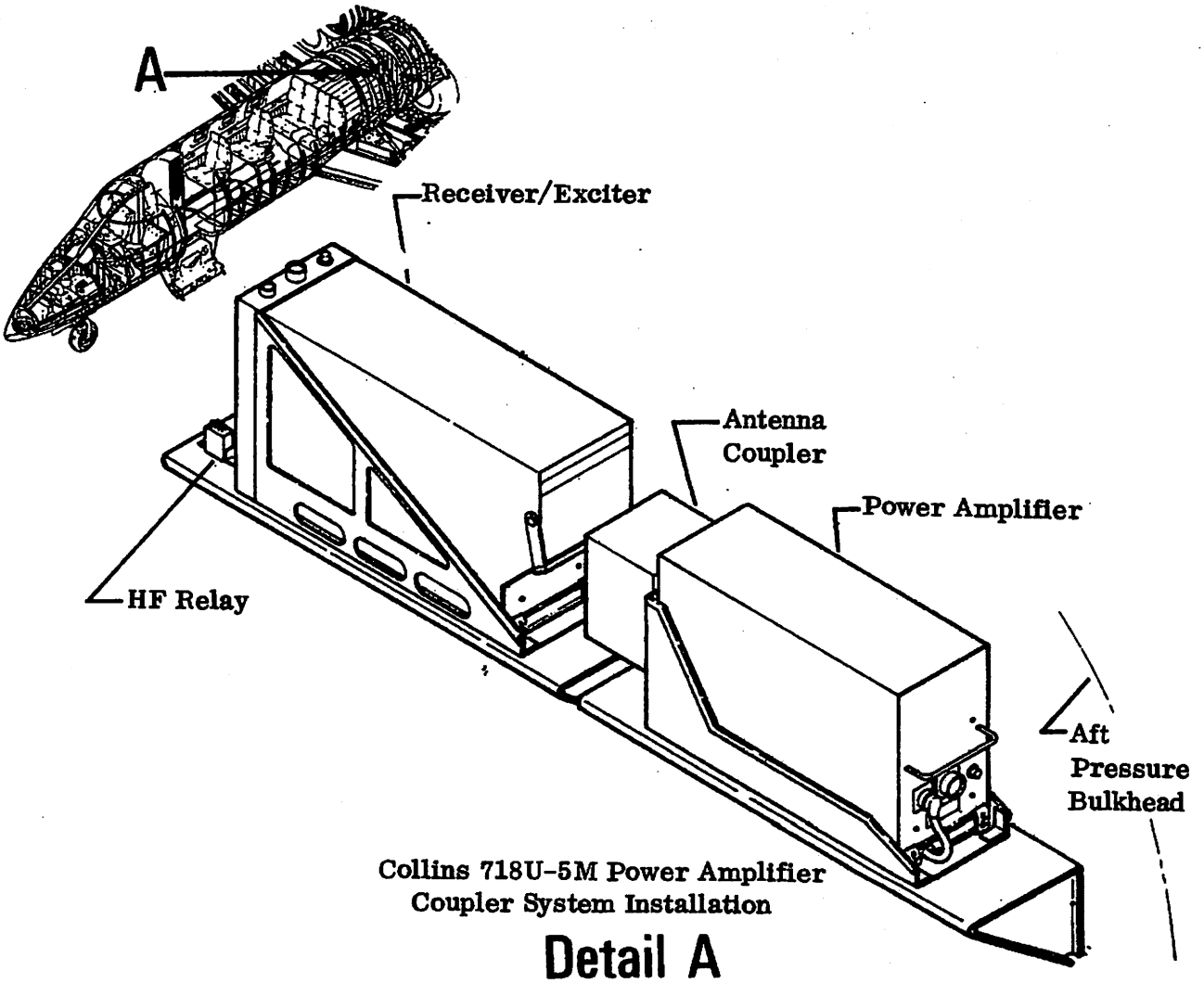
D. Install Antenna Coupler (Colling 718U-5M) (See figure 201.)
(1) Install antenna coupler on mounting rack and secure with attaching parts.
(2) Install interconnecting wire between antenna and coupler into terminal post on coupler. Tighten knurl nut finger tight.
(3) Install power amplifier as stated in steps B (1) through B (2) of this section.
(4) Install HF cover, assuring that Velcro tape is firmly meshed.
(5) Install all previously removed equipment.

NOTE: The electrical components are to be bonded to aircraft structure with a maximum resistance of 0.0015 ohm.

(6) Restore electrical power to aircraft.

E. Remove Antenna Coupler (Sunair ACU150)
   (1) Remove electrical power from aircraft.
   (2) Remove equipment as required to gain access to aft pressure bulkhead.
   (3) Disconnect connector attaching antenna feed through to antenna coupler.
   (4) Disconnect electrical and coax connectors from antenna coupler.
   (5) Remove antenna coupler and attaching parts from mounting rack and aircraft.

F. Install Antenna Coupler (Sunair ACU150)
   (1) Install antenna coupler in mounting rack and secure with attaching parts.
   (2) Connect electrical and coax connectors to antenna coupler.
   (3) Connect antenna feed through to antenna coupler with attaching parts.
   (4) Install previously removed equipment and secure with attaching parts.
   (5) Restore electrical power to aircraft.



Power Amplifier-Coupler Installation (Typical)
Figure 201

HF ANTENNA - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Antenna (See figure 201.)

WARNING: DO NOT TOUCH THE ANTENNA WHILE SYSTEM IS TRANSMITTING, AS RF BURNS AND DEATH COULD RESULT.

(1) Remove all electrical power from aircraft.
(2) Using an aerostand or other suitable equipment, gain access to leading edge of vertical stabilizer where antenna is attached.
(3) Remove tension on antenna by loosening tension ring.
(4) Support antenna and remove nut, bolt, solder lug, and spacer attaching antenna to vertical stabilizer.
(5) Lower loose end of antenna to ground.
(6) Pull slack in antenna and, using emery paper between fingers, remove insulator sleeve located on top of fuselage.
(7) Remove antenna wire from jaws in insulator body.
(8) Retain insulator sleeve for reinstallation.

B. Install Antenna (See figure 201.)

NOTE: Fay surface seal all interfacing surfaces of this installation with Pro-Seal 890.

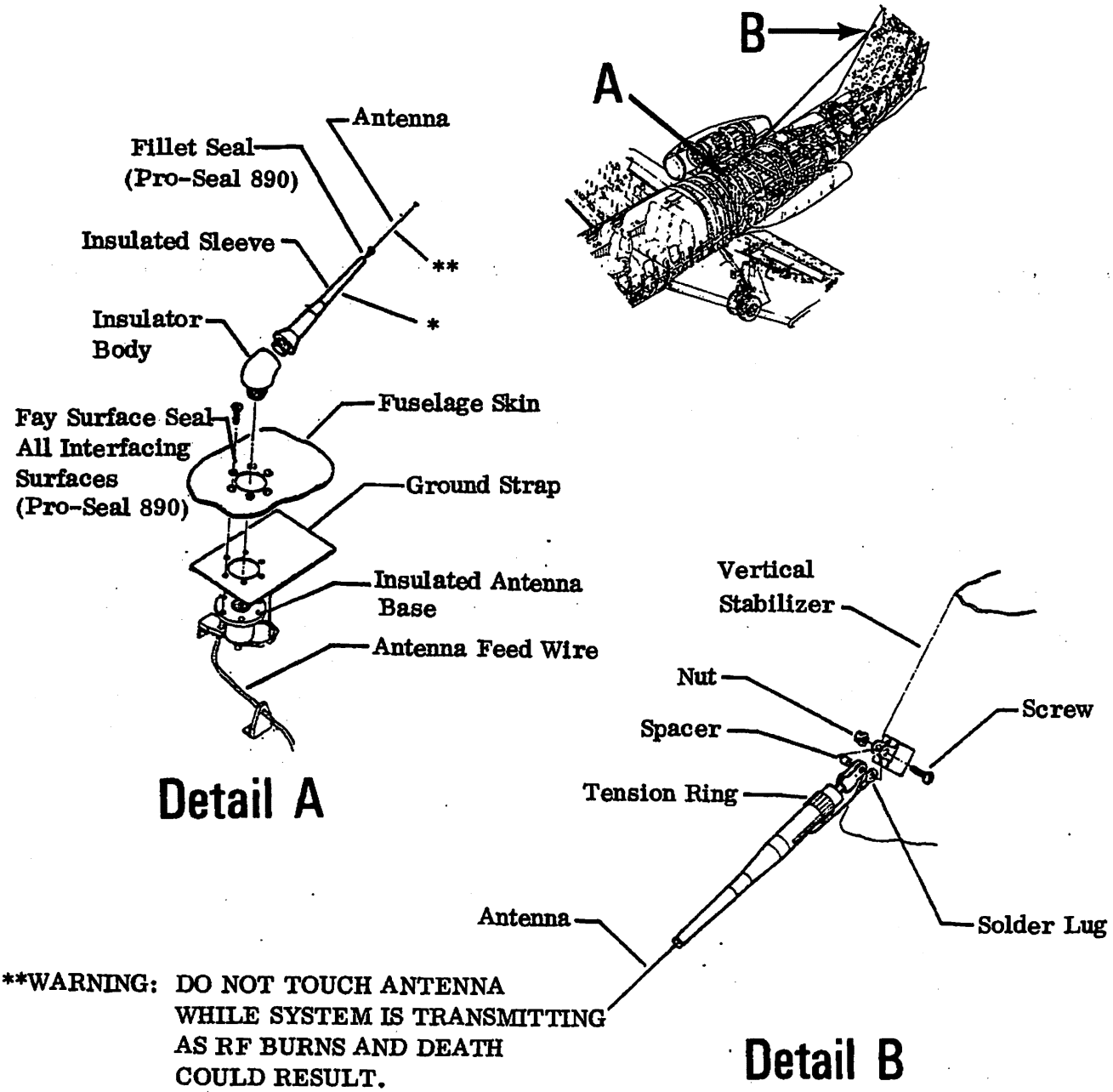
(1) Install insulator sleeve on antenna wire and insert stripped end of antenna wire in jaws embedded in insulator body.

NOTE: Assure that 3/8-inch length of bare conductor is firmly secured by the jaws.

(2) Fill threaded cavity of insulator with Dow Corning DC-4 silicone grease.
(3) Screw sleeve into insulator body, forcing grease into sleeve hole.
(4) Unscrew sleeve and refill threaded cavity of insulator with DC-4.
(5) Screw sleeve into insulator body finger tight. Emery paper may be used between fingers to assure maximum finger torque. Do not use pliers.

NOTE: Adequate quantity of packed DC-4 and a tight connection are of critical importance.

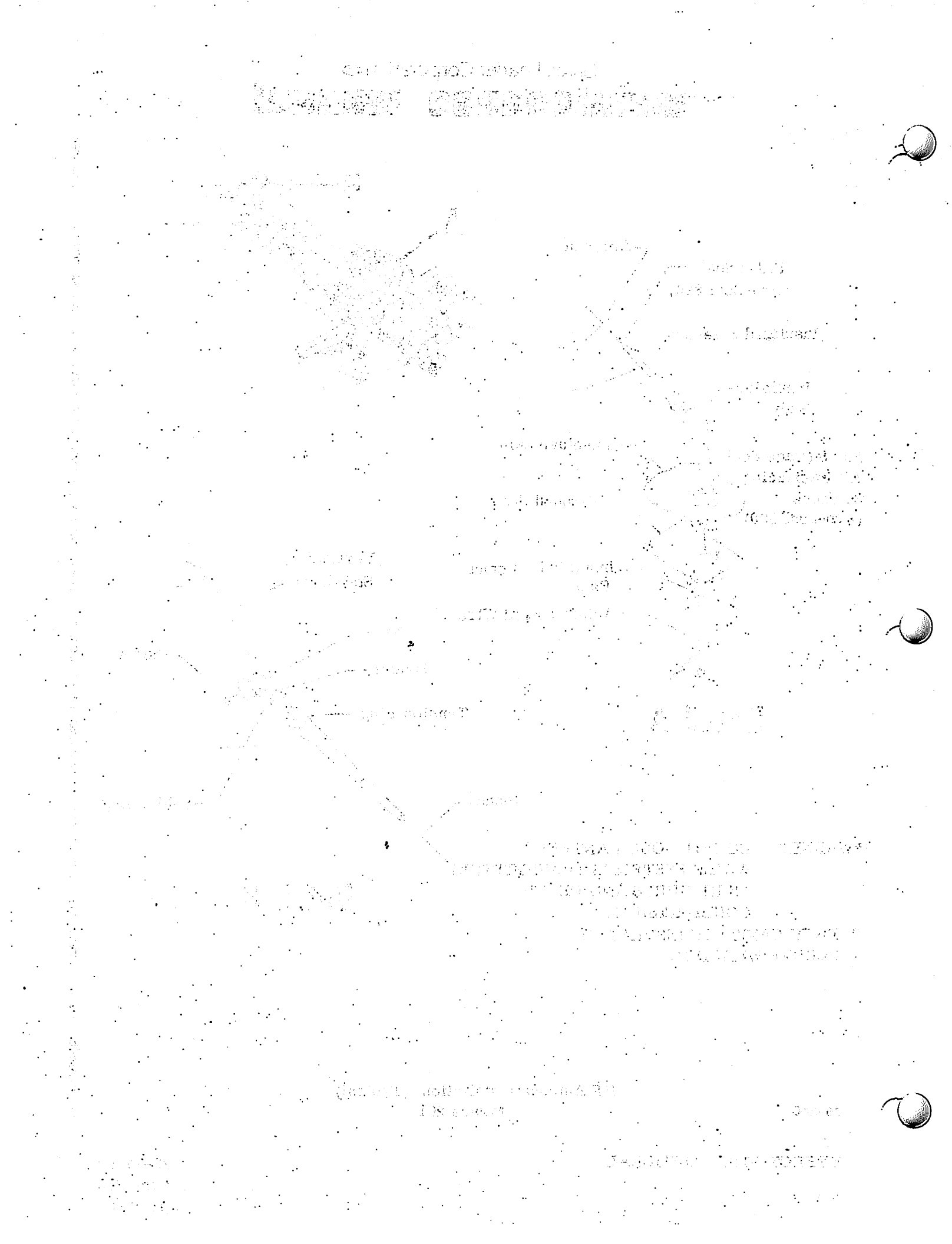
(6) Using an aerostand or other suitable equipment, gain access to antenna attachment point on leading edge of vertical stabilizer.
(7) Attach antenna to vertical stabilizer using bolt, solder lug, spacer, and nut.
(8) Apply 30 (±5) pounds tension to antenna by tightening tension knurl nut.
(9) Restore electrical power to aircraft.



**WARNING: DO NOT TOUCH ANTENNA WHILE SYSTEM IS TRANSMITTING AS RF BURNS AND DEATH COULD RESULT.

* PACK CAVITY IN INSULATED SLEEVE WITH DC4.

HF Antenna Installation (Typical)
Figure 201



HF CONTROL PANEL - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Control Panel (See figure 201.)

(1) Remove electrical power from aircraft.

(2) Release quick-attach fasteners securing control panel to pedestal.

(3) Pull control panel out of pedestal sufficiently to disconnect electrical connectors from control panel.

(4) Remove control panel from aircraft.

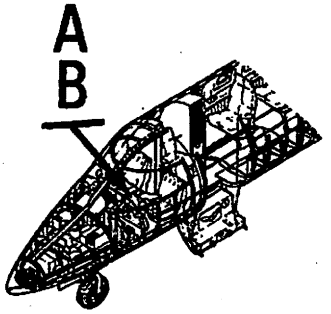
B. Install Control Panel (See figure 201.)

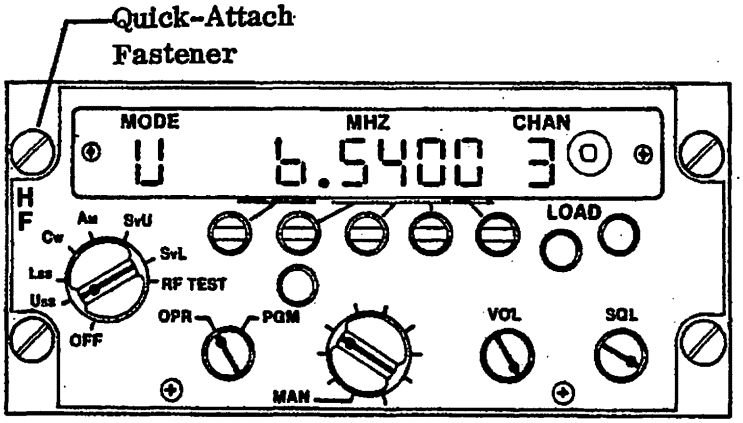
(1) Connect electrical connectors to control panel.

(2) Slide control panel into pedestal.

(3) Fasten quick-attach fasteners.

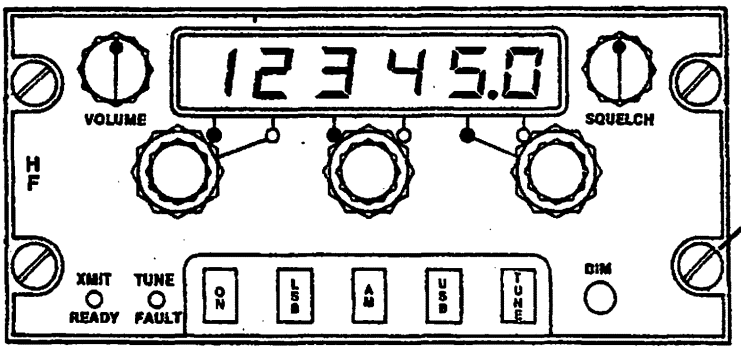
(4) Restore electrical power to aircraft.





Collins 718U-5M HF Control Panel

Detail A



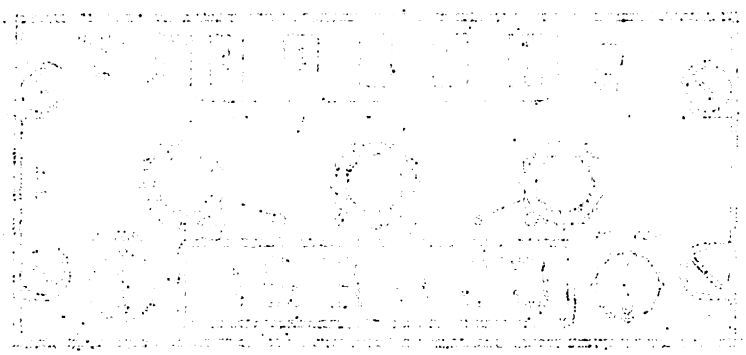
Sunair SCU55 HF Control Panel

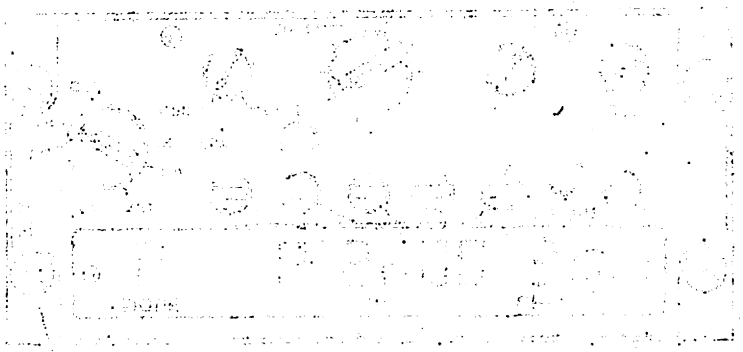
Detail B

16-30A
16-29A

HF Control Panel
Figure 201

EFFECTIVITY: OPTIONAL





HF AUDIO ADAPTER BOX - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove HF Audio Adapter Box (See figure 201.)

(1) Remove electrical power from aircraft.

(2) Gain access to audio adapter box, located between stringers 11R and 12R at frame 7, adjacent to copilot's seat.

(3) Remove attaching parts securing audio adapter box to support brackets.

(4) Disconnect electrical connector from adapter box.

(5) Remove audio adapter box from aircraft.

B. Install HF Audio Adapter Box (See figure 201.)

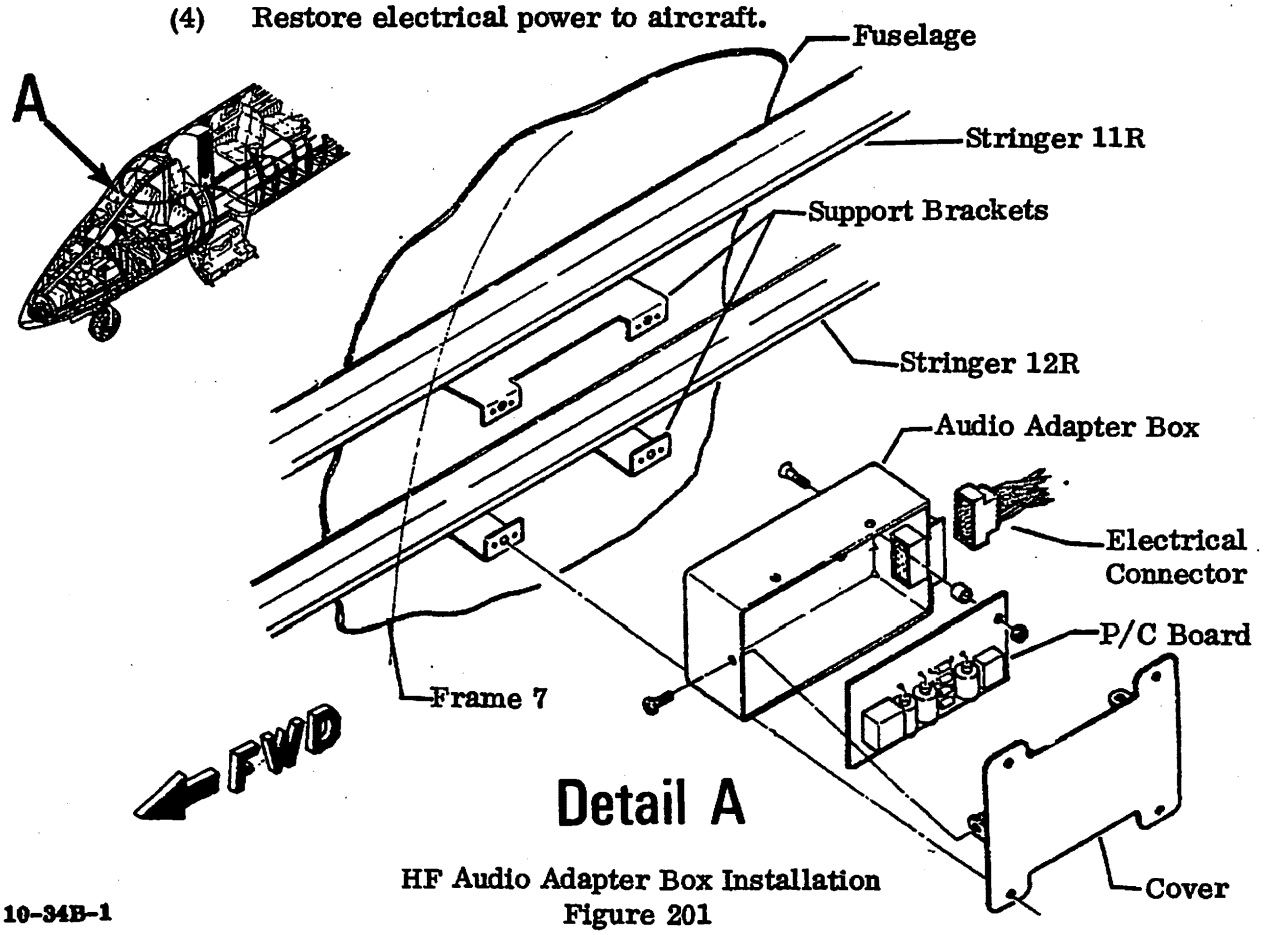
(1) Install audio adapter box and secure to support brackets with attaching parts.

(2) Connect electrical connector to audio adapter box.

(3) Install any equipment that was removed to gain access to audio adapter box.

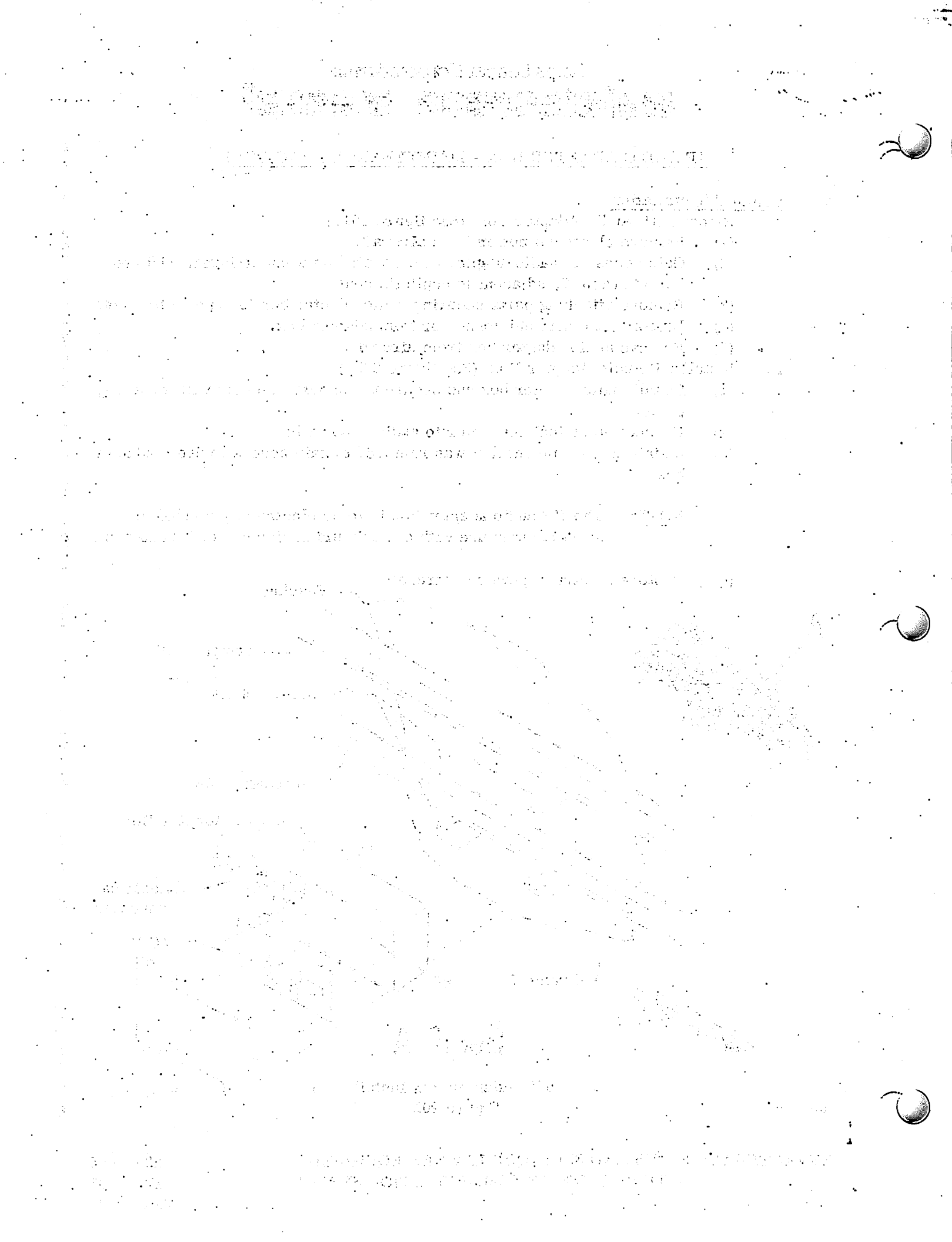
NOTE: The HF audio adapter box is to be electrically bonded to support structure with a maximum resistance of 0.0015 ohm.

(4) Restore electrical power to aircraft.



HF Audio Adapter Box Installation
Figure 201

10-34B-1



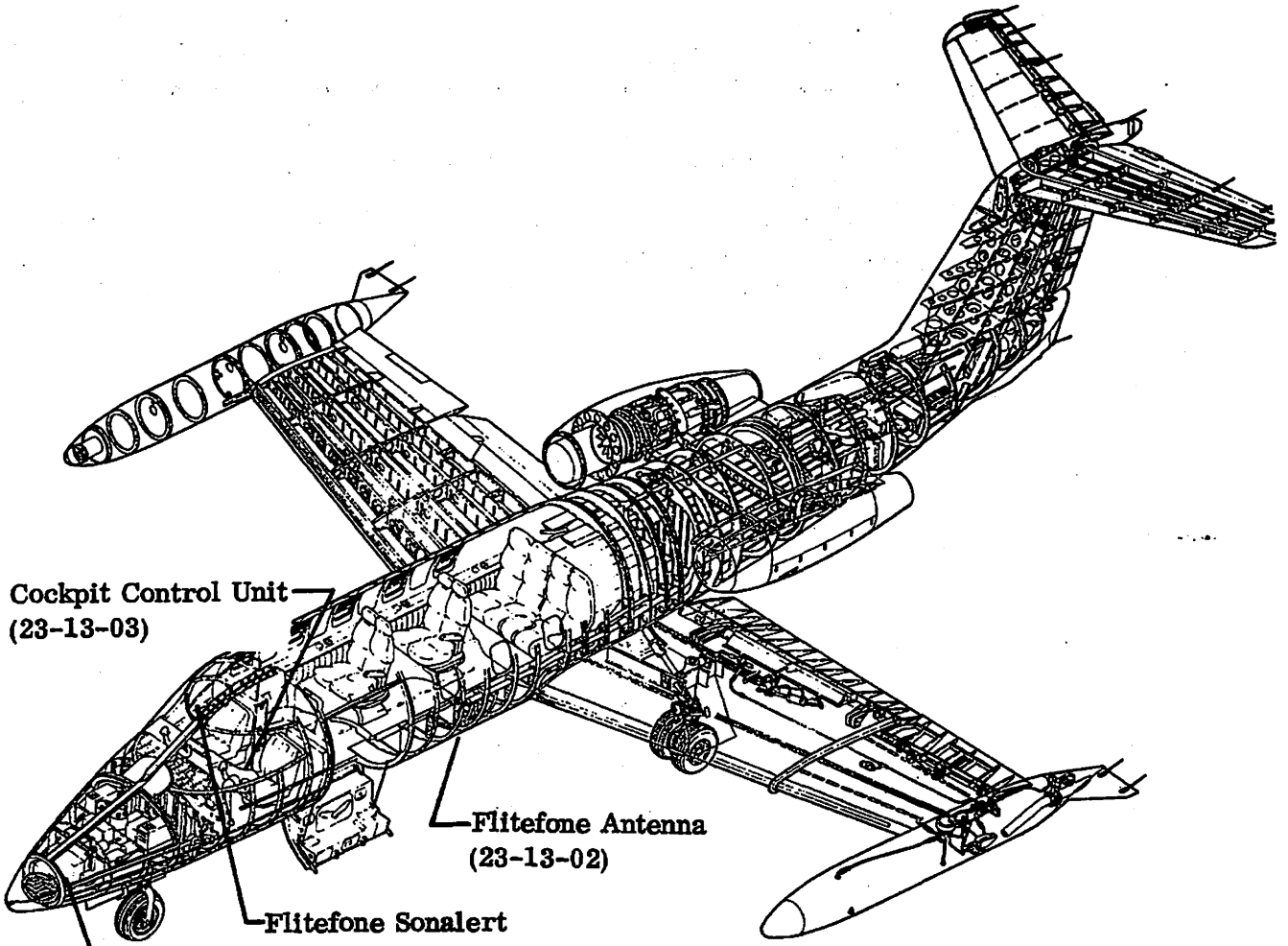
FLITEFONE - DESCRIPTION AND OPERATION

1. Description (See figures 1 and 2.)
   A. The Flitefone provides for telephone communications between the aircraft and ground locations through the use of HF and UHF frequencies.
   B. The Flitefone system consists of a transceiver, antenna, a control unit, an HF/Flitefone interface relay, Flitefone Sonalert, and handset/cradle.
      (1) The Flitefone transceiver is located in the nose compartment.
      (2) The blade antenna is located on the bottom of the fuselage between stringer 21L and stringer 21R. On Aircraft 25-061, 25-070 thru 25-116, the antenna is located between frames 1 and 2. On Aircraft 25-117 and Subsequent, the antenna is located between frames 15 and 16.
      (3) The cockpit control unit is located in the pedestal.
      (4) The HF/Flitefone interface consists of a relay mounted on the HF receiver/exciter mounting rack.
      (5) The Flitefone Sonalert is located on the cockpit wall, adjacent to the copilot's seat.
   C. Maintenance of the Flitefone communication system is limited to the replacement of plug-in modules and an inspection/check.
   D. Overhaul of Flitefone communication system components may be accomplished only by certified Flitefone mechanics.
   E. Power requirements are 27.5 vdc, 0.45 ampere (12 watts) to receive, and 2.3 amperes (55 watts) to transmit.

2. Operation (See figure 2.)

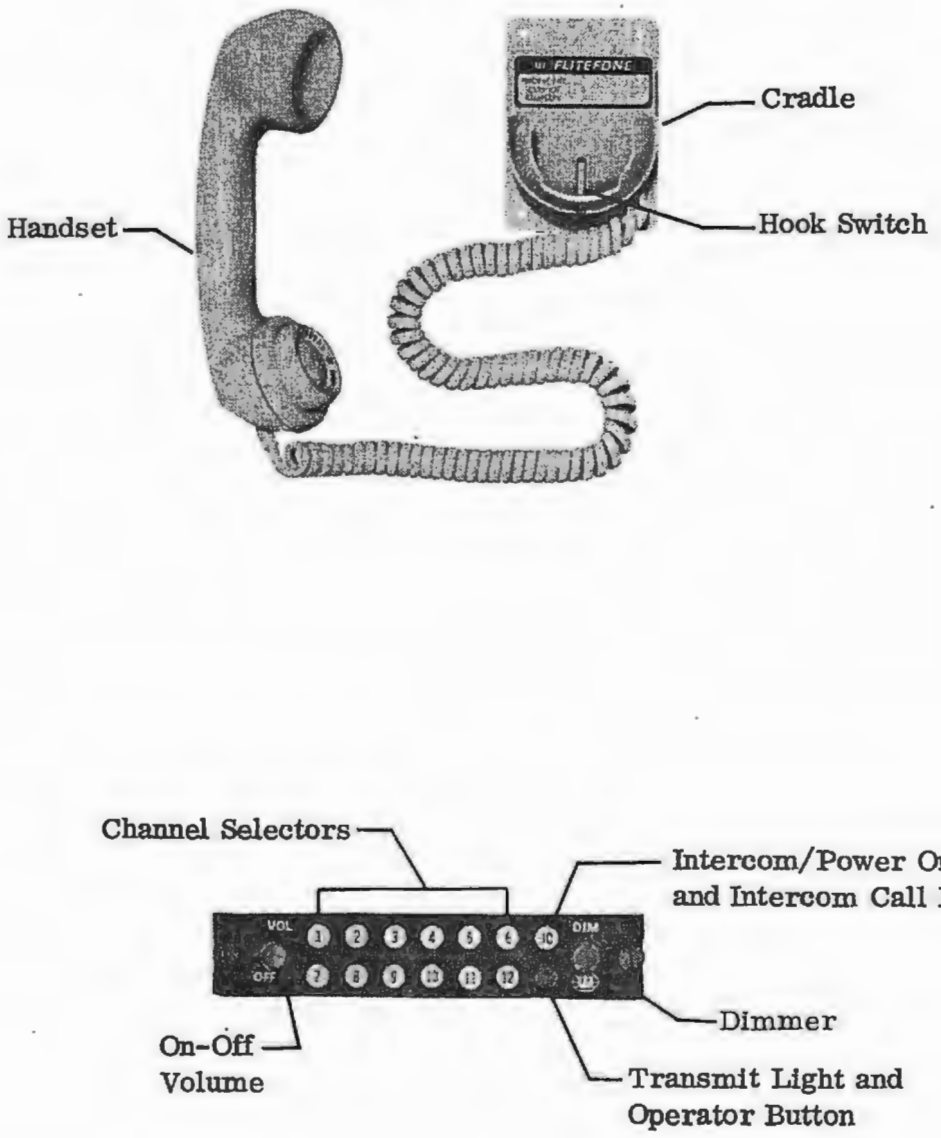
   NOTE: Operator of the Flitefone must be licensed with the FCC.

   A. To operate the Flitefone, proceed as follows:
      (1) Assure that UHF circuit breaker is depressed.
      (2) Turn system on and allow for one-minute warm-up.
      (3) Remove handset from cradle.
      (4) Select desired ground station by pressing channel number on control unit.
      (5) Adjust volume control knob on control unit for desired voice or dial tone level.
      (6) Call the operator by pushing "OPERATOR" black button on control unit or, if so equipped, the PUSH-TO-TALK button on the handset.
      (7) Give operator required information to make call.
      (8) When call is complete, place handset in cradle.

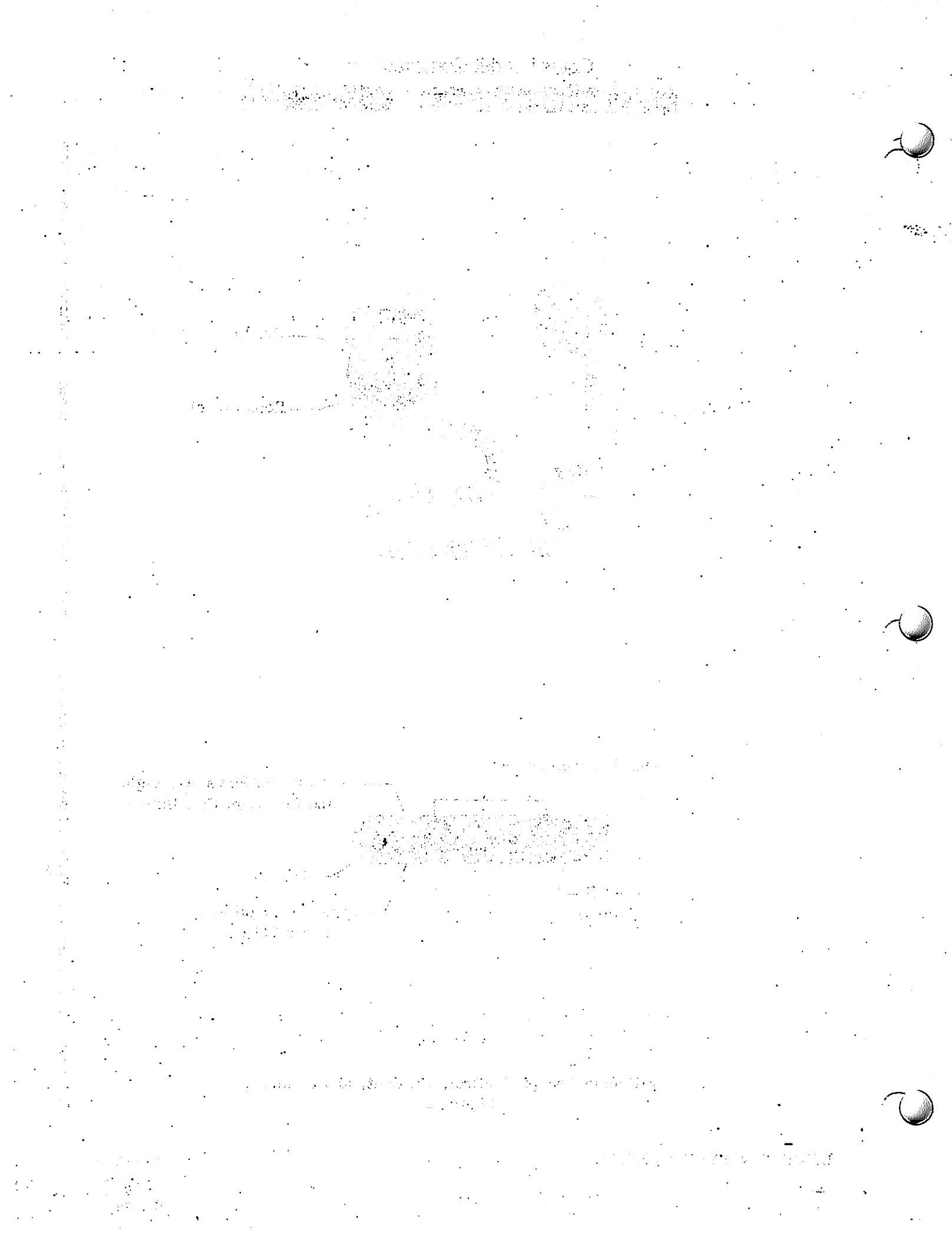


Flitefone Equipment Locator
Figure 1

EFFECTIVITY: OPTIONAL



Flitefone Cockpit Control, Handset, and Cradle
Figure 2



FLITEFONE SYSTEM - MAINTENANCE PRACTICES

1. Inspection/Check

A. Tools and Equipment

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Airborne Radio Telephone Test Set	TS-25	Wulfsburg Electronics Inc.	To simulate ground station.
Thruline Wattmeter (with 200-500 MHz, 25 watt detector)	Model 43	Bird Electronics	To measure transmission power.

B. Operational Check (Flitefone System)

NOTE: The following procedure may be performed using either the cabin control unit or the cockpit control unit.

(1) Position aircraft a minimum of 50 feet away from any metallic structures.
(2) Set Battery Switch(es) to OFF and pull UHF circuit breaker.
(3) Remove RH nose compartment access door and disconnect antenna coax at transceiver.
(4) Connect thruline wattmeter in series with transceiver, antenna connector, and coax line to antenna. Assure that RG8/U coax cable is used between transceiver and wattmeter.
(5) Connect a ground power cart to aircraft.
(6) Set Battery Switch(es) on and depress UHF circuit breaker.
(7) Set Flitefone VOL/OFF Switch on and allow approximately 3 minutes warm-up.
(8) Lift handset from cradle and press channel 1 button. Channel 1 button shall illuminate.
(9) Place handset to ear, rotate VOL/OFF Switch clockwise, and listen for receiver noise volume to vary as the switch is turned.
(10) Depress OPERATOR button (labeled T) on control unit and monitor forward power indicated on wattmeter. Minimum forward power is 8 watts.

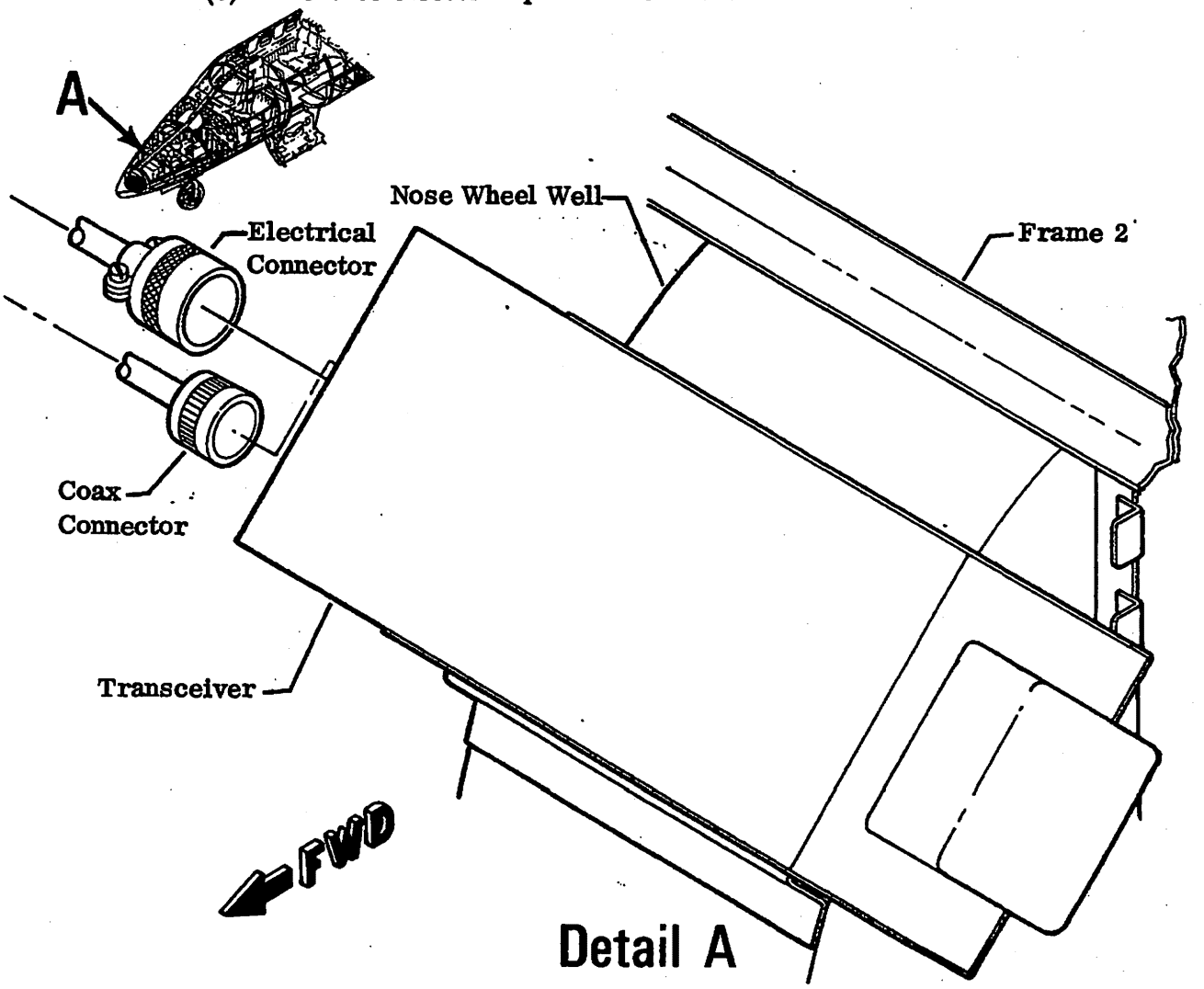
(11) Monitor reflected power on wattmeter. Maximum reflected power is 1 watt.
(12) Signal wave ratio shall not exceed 1.4.
(13) Repeat steps (8) through (12) for all remaining channels.

NOTE: When OPERATOR button is depressed, the transmit light shall illuminate and remain illuminated until the hook switch is depressed.

(14) With handset off hook switch, depress intercom button. The intercom light shall illuminate, and signaling device shall sound.
(15) Place handset back in cradle.
(16) Turn unit off and pull UHF circuit breaker.
(17) Disconnect wattmeter from aircraft and reconnect antenna coax to transceiver.
(18) Install RH nose compartment access door.
(19) Place telephone test set near aircraft.
(20) Depress UHF circuit breaker and turn Flitefone and test set on.
(21) Select a common channel for test set and Flitefone to transmit on.
(22) Depress OPERATOR button in aircraft. Test set shall receive a signal and two-way voice communication shall be possible. Check for clarity of voice transmission.
(23) Depress hook switch.
(24) Call aircraft from test set using aircraft telephone number. Aircraft shall receive a signal and two-way voice communication shall be possible. Check for clarity of voice transmission.
(25) Place handset back in cradle and turn unit off.

FLITEFONE TRANSCEIVER - MAINTENANCE PRACTICES

1. Removal/Installation
   - A. Remove Transceiver (See figure 201.)
     - (1) Remove electrical power from aircraft.
     - (2) Remove RH nose compartment access door and disconnect electrical connectors from transceiver.
     - (3) Remove attaching parts and transceiver from aircraft.
   - B. Install Transceiver (See figure 201.)
     - (1) Install transceiver in RH avionics compartment and secure with attaching parts.
     - (2) Connect electrical connectors to transceiver and install nose compartment access door.
     - (3) Restore electrical power to aircraft.



Flitefone Transceiver Installation (Typical)
Figure 201

10-66A

FLITEFONE ANTENNA - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Flitefone Antenna (See figure 201.)

(1) Remove electrical power from aircraft.

(2) Remove screws securing antenna to fuselage just off of frame 15.

CAUTION: USE CARE NOT TO DAMAGE AIRCRAFT SKIN WHEN REMOVING SEALANT.

(3) Using caution, break sealant bond between antenna and fuselage.

(4) Pull antenna away from fuselage and disconnect coax connector from antenna. Ensure that coax cable does not slip back into hole in fuselage.

(5) Remove antenna from aircraft area.

B. Install Flitefone Antenna (See figure 201.)

(1) Prepare antenna mounting surface and mounting area on fuselage for electrical bonding. (Refer to Chapter 20 of Wiring Manual.)

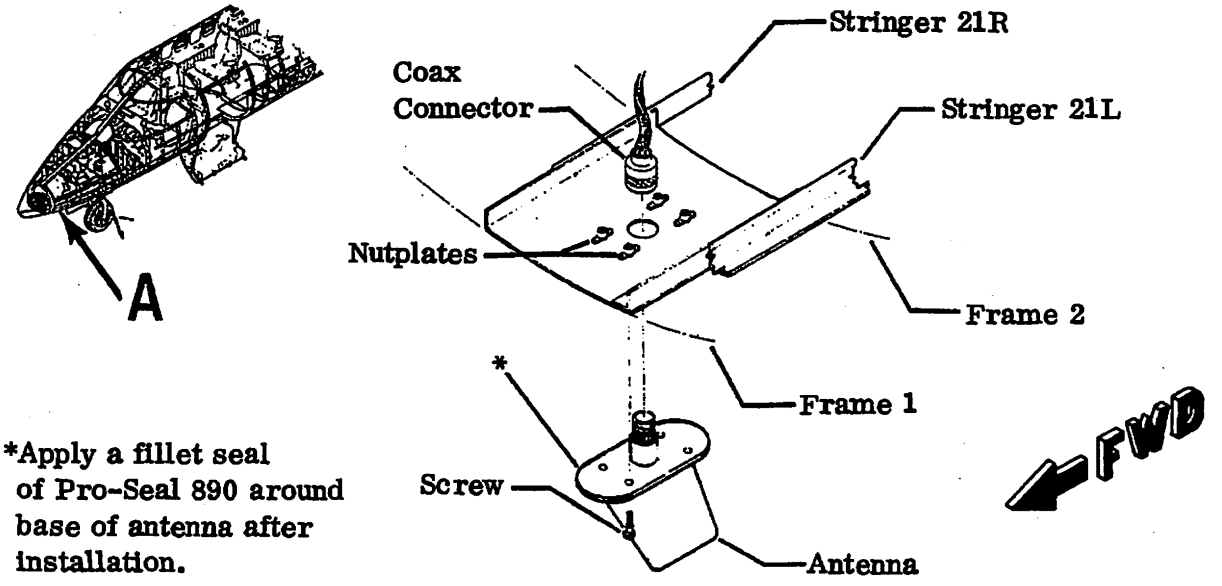
(2) Connect coax connector to antenna.

(3) Install antenna in fuselage and secure with screws.

(4) Clean antenna base and fuselage mating area with a clean cloth and methyl-ethyl-ketone (MEK).

(5) Apply fillet seal (Pro-Seal 890) around entire base of antenna.

(6) Restore electrical power to aircraft.



Detail A

Flitefone Antenna Installation (Typical)
Figure 201

FLITEFONE CONTROL UNIT - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Flitefone Control Unit (See figure 201.)

(1) Remove electrical power from aircraft.

(2) Release quick-attach fasteners and carefully slide control unit out of pedestal.

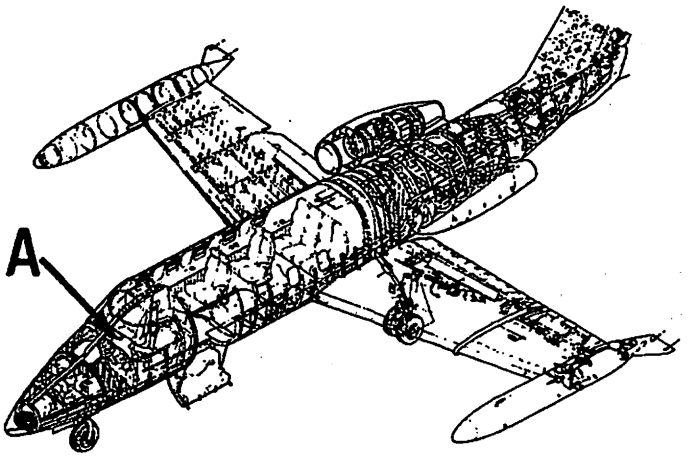
(3) Disconnect electrical connectors from control unit and remove control unit from aircraft.

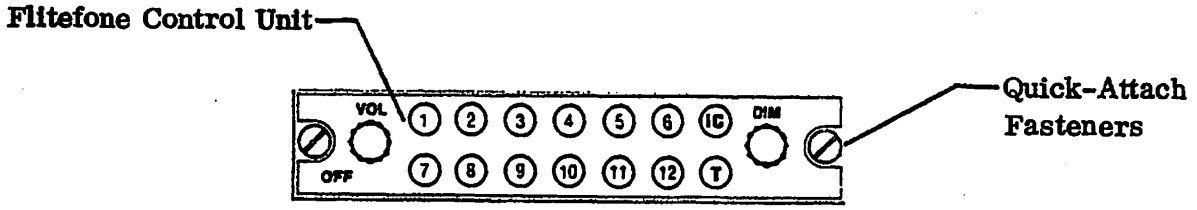
B. Install Flitefone Control Unit (See figure 201.)

(1) Connect electrical connectors to control unit.

(2) Slide control unit into pedestal and secure with quick-attach fasteners.

(3) Restore electrical power to aircraft.





Detail A

Flitefone Control Unit Cockpit Installation
Figure 201

HF/FLITEFONE INTERFACE RELAY - MAINTENANCE PRACTICES

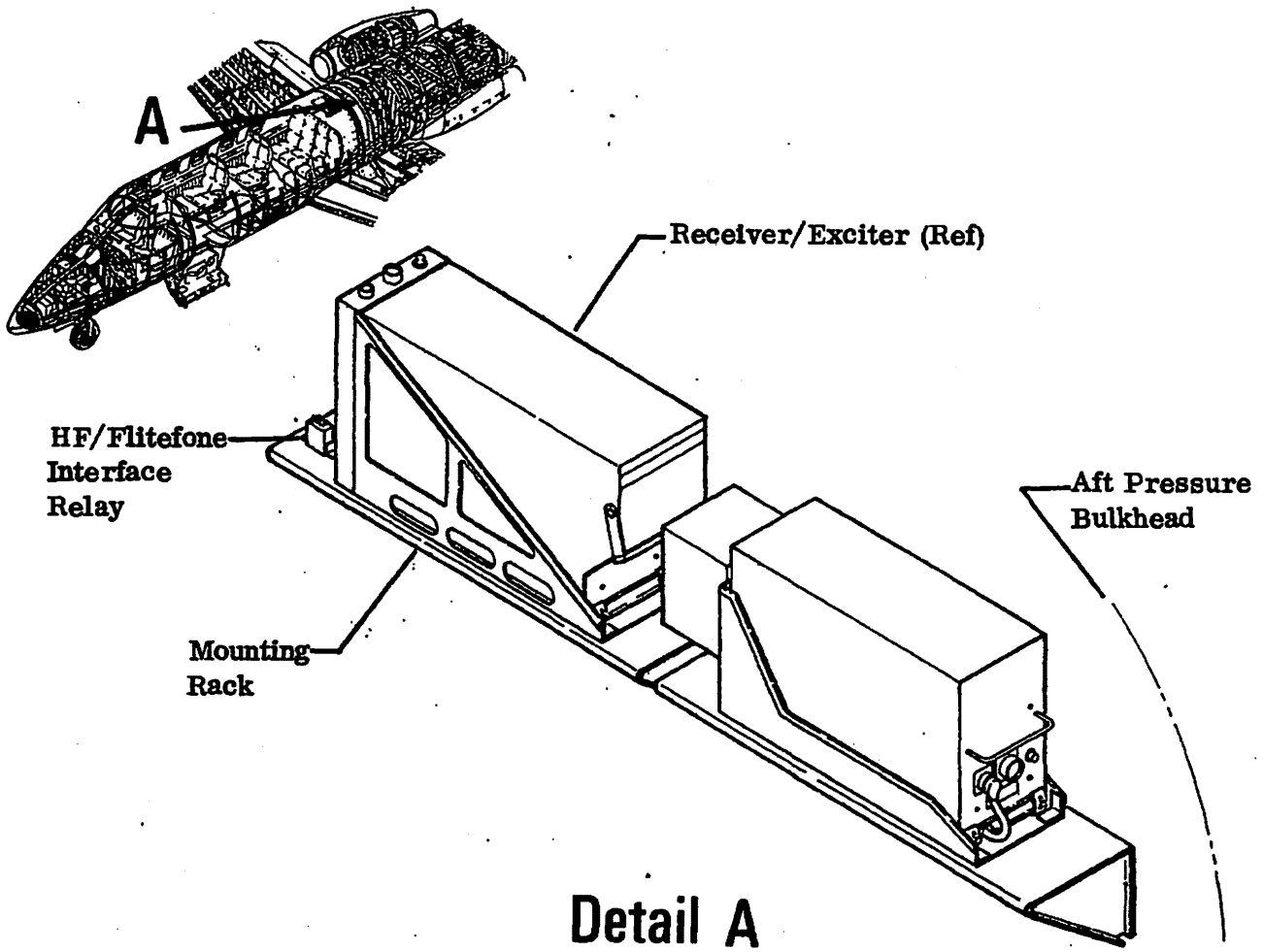
1. Removal/Installation

A. Remove Interface Relay (See figure 201.)

(1) Remove electrical power from aircraft.
(2) Gain access to HF receiver/exciter mounting rack.
(3) Remove attaching parts securing relay to mounting rack.
(4) Tag each wire attached to relay.
(5) Unsolder wires from relay and remove relay from aircraft.

B. Install Interface Relay (See figure 201.)

(1) Solder wires to relay.
(2) Remove tags from wires.
(3) Attach relay to mounting rack with attaching parts.
(4) Install parts removed in step A (2) above.
(5) Restore electrical power to aircraft.



HF/Flitefone Interface Relay Installation (Typical)
Figure 201

FLITEFONE SONALERT - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Sonalert (See figure 201.)

(1) Remove electrical power from aircraft.

(2) Remove upholstery as needed to gain access to Sonalert at frame 7 on RH side of cockpit.

(3) Cut and tag Sonalert wires.

(4) Unscrew top of Sonalert to release it.

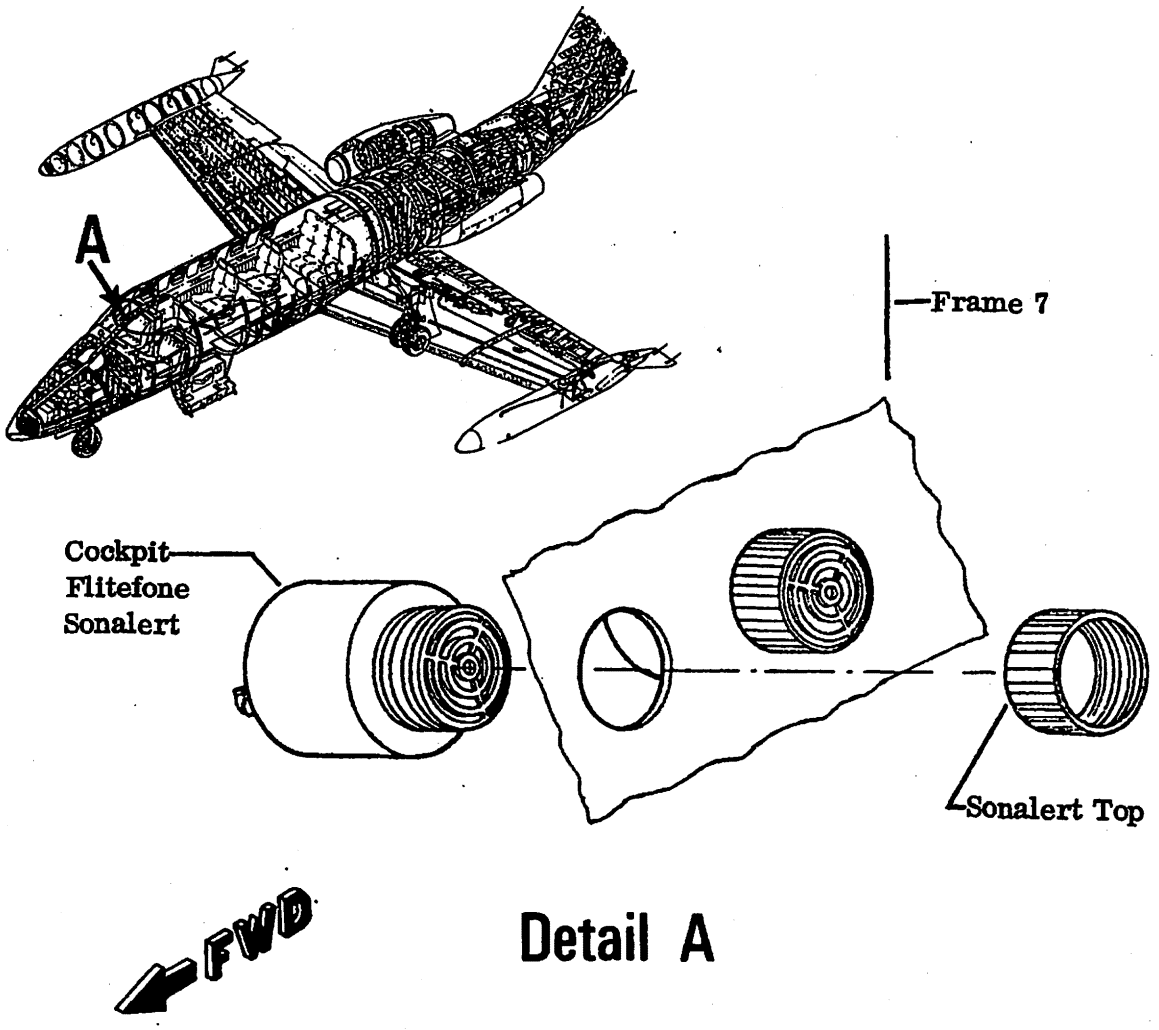
B. Install Sonalert (See figure 201.)

(1) Remove top from Sonalert.

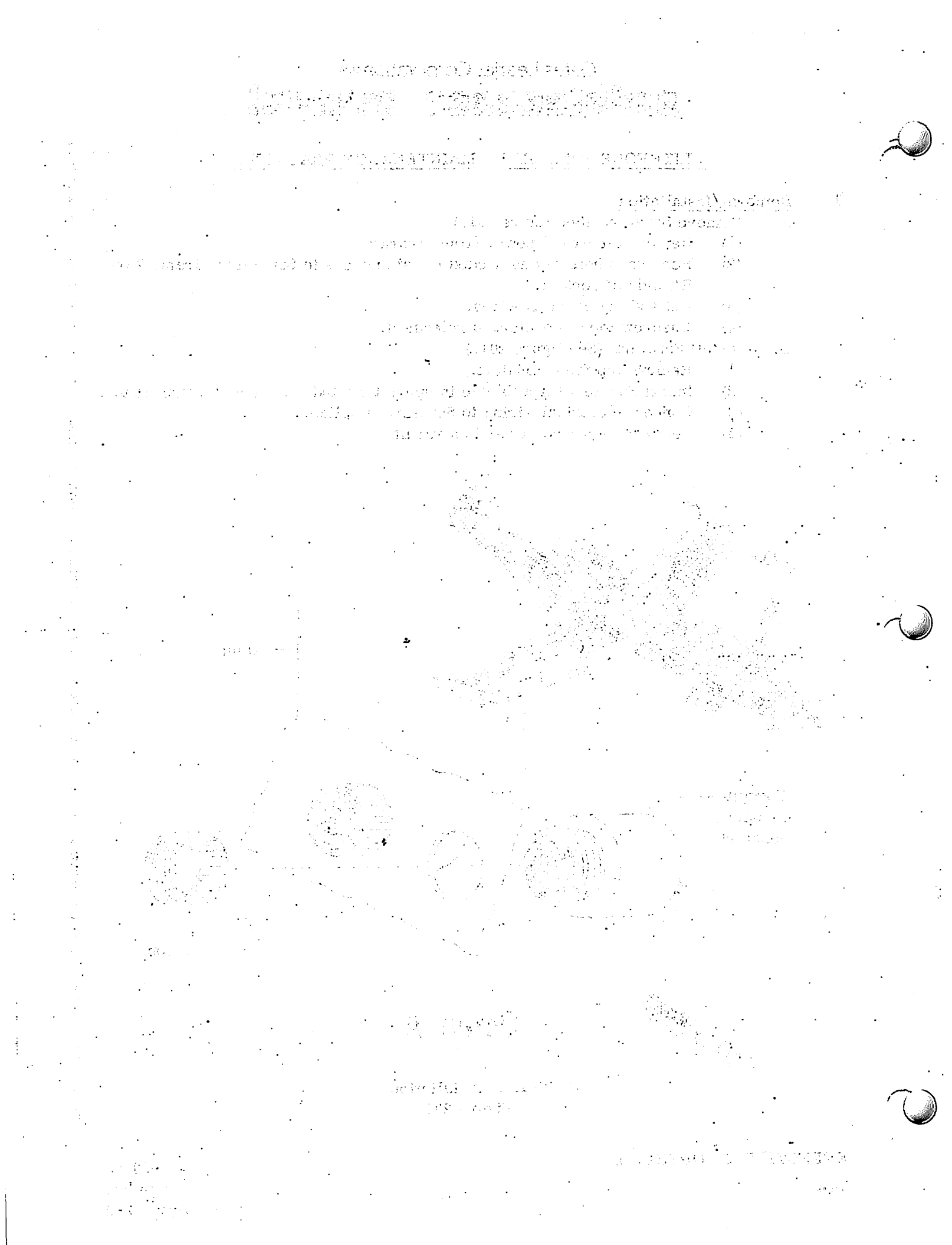
(2) Insert Sonalert through hole in upholstery and secure with Sonalert top.

(3) Connect electrical wiring to Sonalert at splice.

(4) Restore electrical power to aircraft.



Sonalert Installation
Figure 201



PASSENGER ADDRESS AND ENTERTAINMENT - DESCRIPTION AND OPERATION

1. Description
   - A. The passenger address and entertainment system consists of a cabin speaker and a tone generator.
   - B. Component Description
     - (1) The cabin speaker is located in the cabin upper center panel and is controlled by switches on the audio control panels.
     - (2) The tone generator is installed between frames 17 and 18 and stringers 8L and 9L.

2. Operation
   - A. The PASS SPKR VOL control regulates the volume level of the ADF audio to the cabin speaker when the PASS ADF Switch is set to PASS ADF. The PASS SPKR VOL control also affects passenger speaker volume while addressing passengers when the Microphone Function Selector is in the PASS SPKR position. Refer to 23-50-00 for further information on switch functions.
   - B. Additional passenger speaker audio is provided when the NO SMOKING FASTEN SEAT BELT - OFF - FASTEN SEAT BELT Switch is set to either the up or down position. In either position, a tone generator produces an audible 800 cycle tone through the passenger speaker.

PASSENGER SPEAKER - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Passenger Speaker (See figure 201.)

(1) Carefully pry off speaker grill using extreme care not to damage grill or surrounding area.

(2) Remove screws which secure speaker to bracket.

(3) Lower speaker and disconnect wiring. Tag wiring.

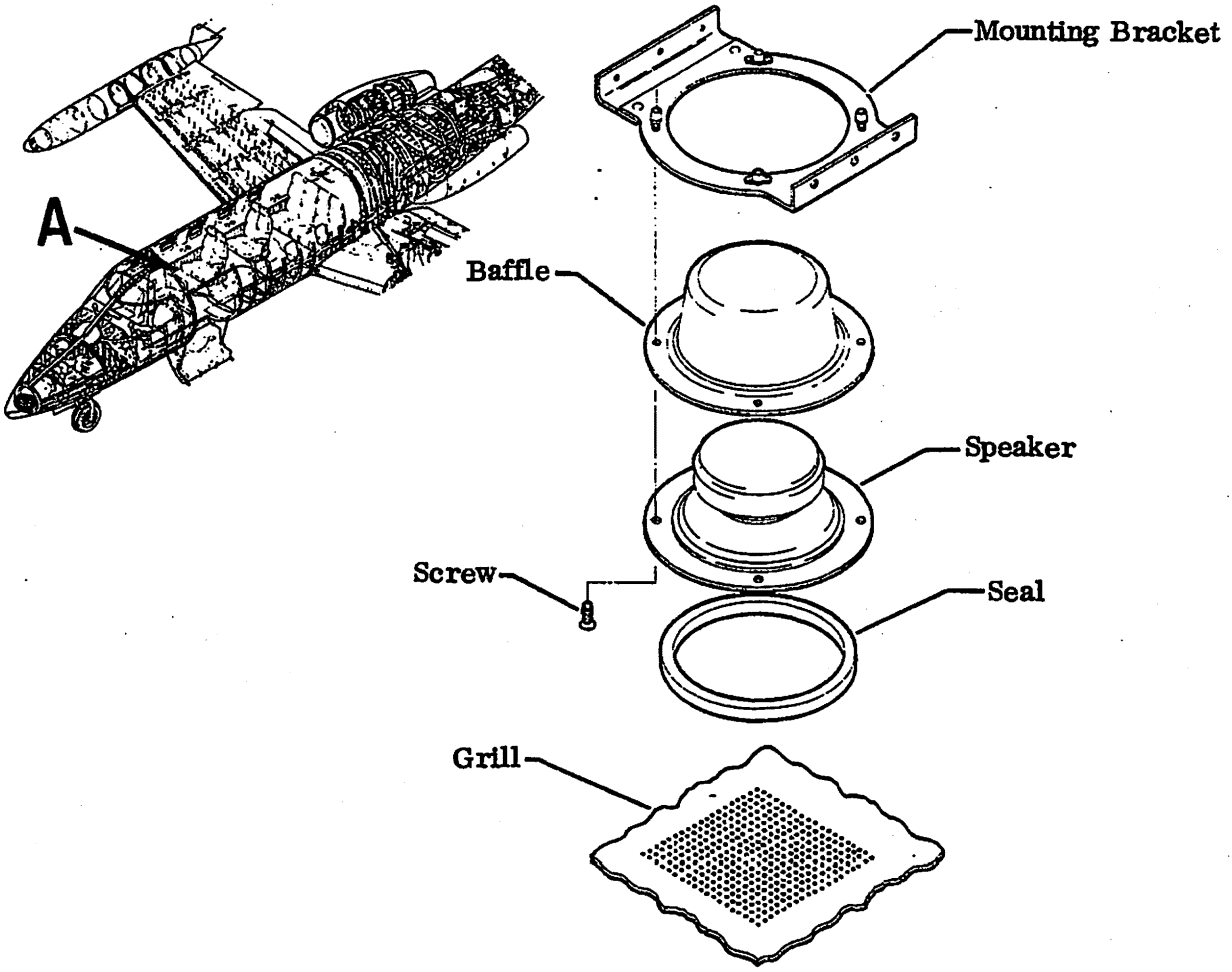
(4) Remove speaker from aircraft.

B. Install Passenger Speaker (See figure 201.)

(1) Connect electrical wiring to speaker and install speaker in center panel.

(2) Secure speaker to structure with screws.

(3) Install speaker grill.



Passenger Speaker Installation (Typical)
Figure 201

TONE GENERATOR - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Tone Generator (See figure 201.)

(1) Remove upholstery as required to gain access to tone generator located between stringers 8L and 9L and frames 17 and 18.

(2) On Aircraft 25-221 and Subsequent, disconnect electrical connector. On Aircraft 25-061, 25-070 thru 25-220, locate electrical wiring splices and cut wiring at this point. Tag wiring.

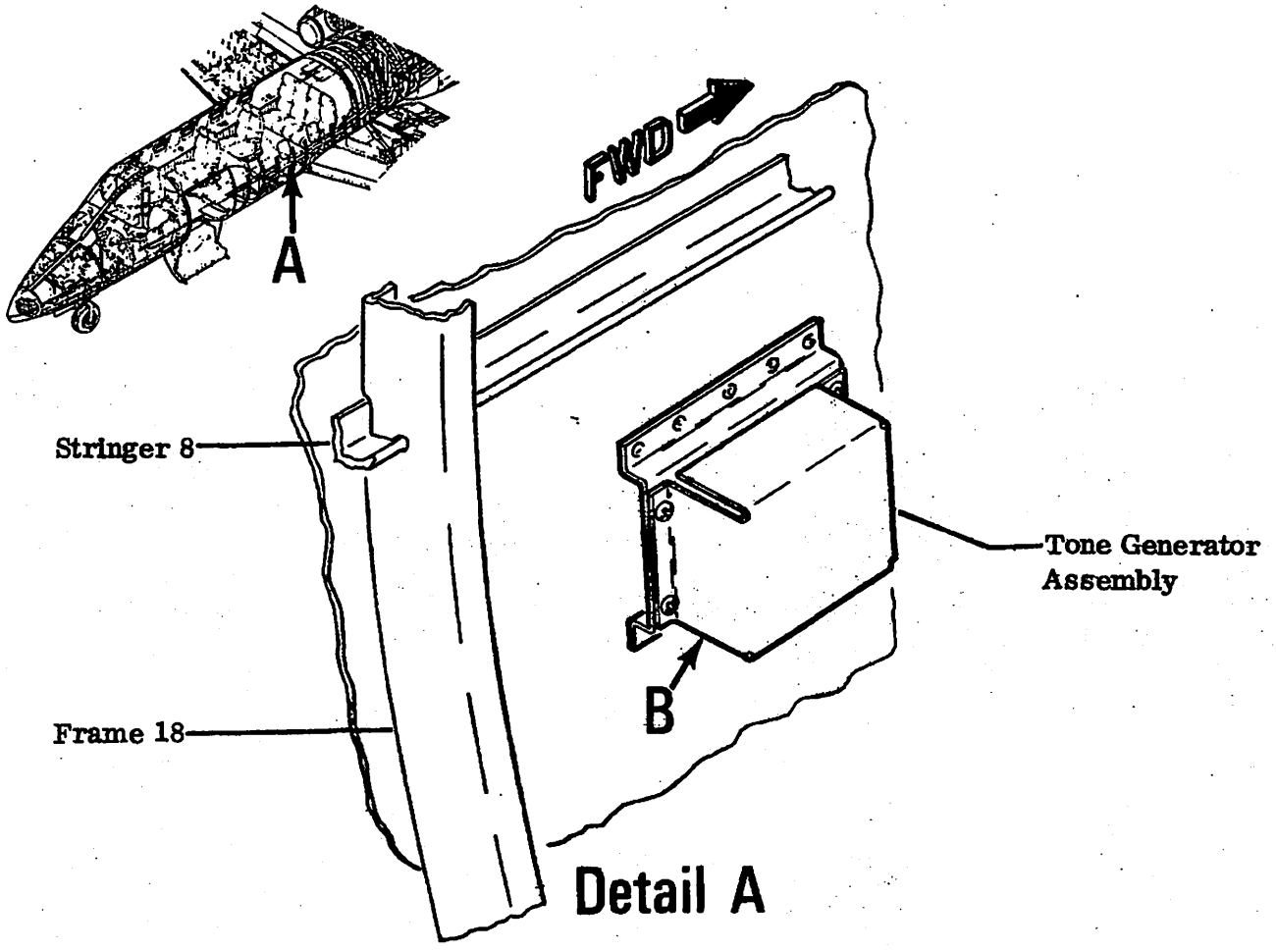
(3) Remove attaching parts and tone generator from aircraft.

B. Install Tone Generator (See figure 201.)

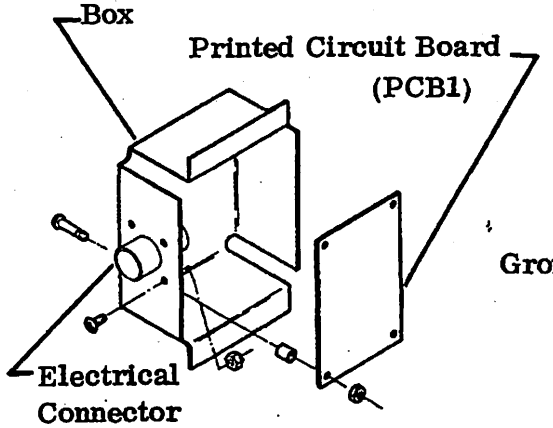
(1) Position tone generator on bracket and secure with attaching parts.

(2) On Aircraft 25-221 and Subsequent, connect electrical connector. On Aircraft 25-061, 25-070 thru 25-220, splice aircraft wiring to tone generator using splices of the same size and type as those which were originally installed. (Refer to Chapter 20 in the Wiring Manual for splice sizes and installation instructions.)

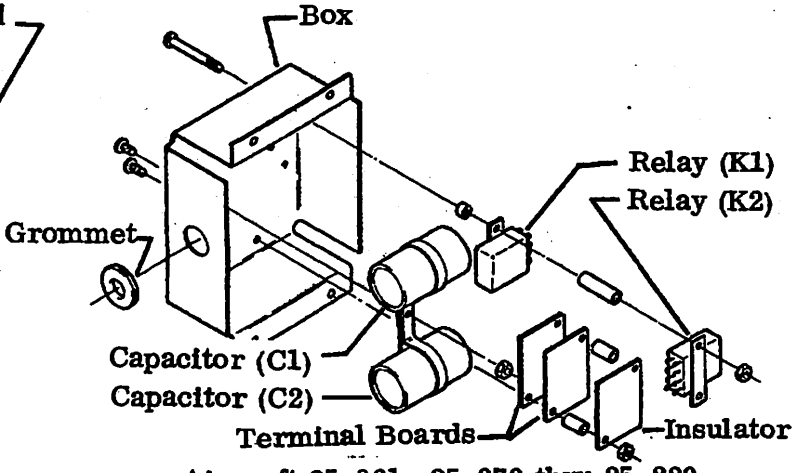
(3) Install previously removed upholstery.



Detail A



Aircraft 25-221 and Subsequent



Aircraft 25-061, 25-070 thru 25-220

Detail B

Tone Generator Installation
Figure 201

9-199C

AUDIO INTEGRATING - DESCRIPTION AND OPERATION

1. Description (See figures 1 and 2.)
   A. The audio control system is an integral part of the communications and navigational audio systems. Two independent, identical audio control panels are installed, one in the pilot's subpanel and one in the copilot's subpanel. Each audio control panel controls its respective cockpit speaker and headphone and both panels feed audio into the passenger speaker. The audio control system provides a means of controlling communications and/or navigation audio information being received or transmitted. The audio control system also controls communications within the aircraft.

2. Operation (See figures 1 and 2.)
   A. The audio control panel switches and their functions are as follows:
      (1) MASTER VOL. This control regulates the volume of all audio input except for sidetone audio, the PASS-SPKR audio, aural warning signals, and the microphone or headphone audio when the SPKR/PHONE-PHONE-EMERGENCY Switch is set to EMERGENCY.
      (2) PASS SPKR VOL. This control regulates the volume level of the ADF in the cockpit speaker when the ADF Mixer Switch is in the center position and the PASS ADF Switch is in the OFF or center position. It also regulates the ADF volume in the passenger speaker when the PASS ADF Switch is set to PASS ADF. This control also affects passenger speaker volume while addressing passengers when the Microphone Function Selector is set to PASS SPKR. This control does not affect the headphone, aural warning, or microphone audio when the microphone is being used in VHF 1, VHF 2, HF, or INPH positions.
      (3) SPKR/PHONE-PHONE-EMERGENCY
         (a) SPKR/PHONE. When the switch is in this position and any mixer switch is on, audio is fed to the headphones and cockpit speaker.
         (b) PHONE. When the switch is in this position and any mixer switch is on, audio is fed to the headphones only.
         (c) EMERGENCY. When the switch is in this position and any mixer switch is on, audio is fed directly to the headphones, bypassing all amplifiers.
      (4) Ten Mixer Switches across the top of the audio control panel are labeled and perform the following functions:
         (a) VHF 1, VHF 2. When in the up position, these switches provide audio from the VHF 1 and VHF 2 transceivers respectively.
         (b) NAV 1, NAV 2. When in the up position, these switches provide audio from the NAV 1 and NAV 2 receivers respectively.

(c) ADF 1, ADF 2. These are three-position type toggle switches. Down is OFF. The center position provides audio to the passenger speaker when the PASS-ADF is in the up position. The up position is the normal mixer position and provides audio from ADF 1 and ADF 2 receivers respectively.

(d) DME. When in the up position, this switch provides audio identification signals from DME receiver.

(e) MKR. When in the up position, this switch provides marker audio from the marker beacon receiver.

(f) HF. When in the up position, this switch provides audio from the HF transceiver.

(g) PASS-ADF. This is a three-position toggle switch and is used only when the ADF mixer switch is in the center position, otherwise it should be in the OFF position. When in the center position, it allows only ADF audio to be heard in the cockpit speaker for the purpose of tuning and volume adjustment and mutes any other mixer audio to the cockpit speaker. When in the up position, it transfers ADF audio from the cockpit speaker to the passenger speaker and mutes any mixer audio to the cockpit speaker; however, mixer audio is provided to the headphones.

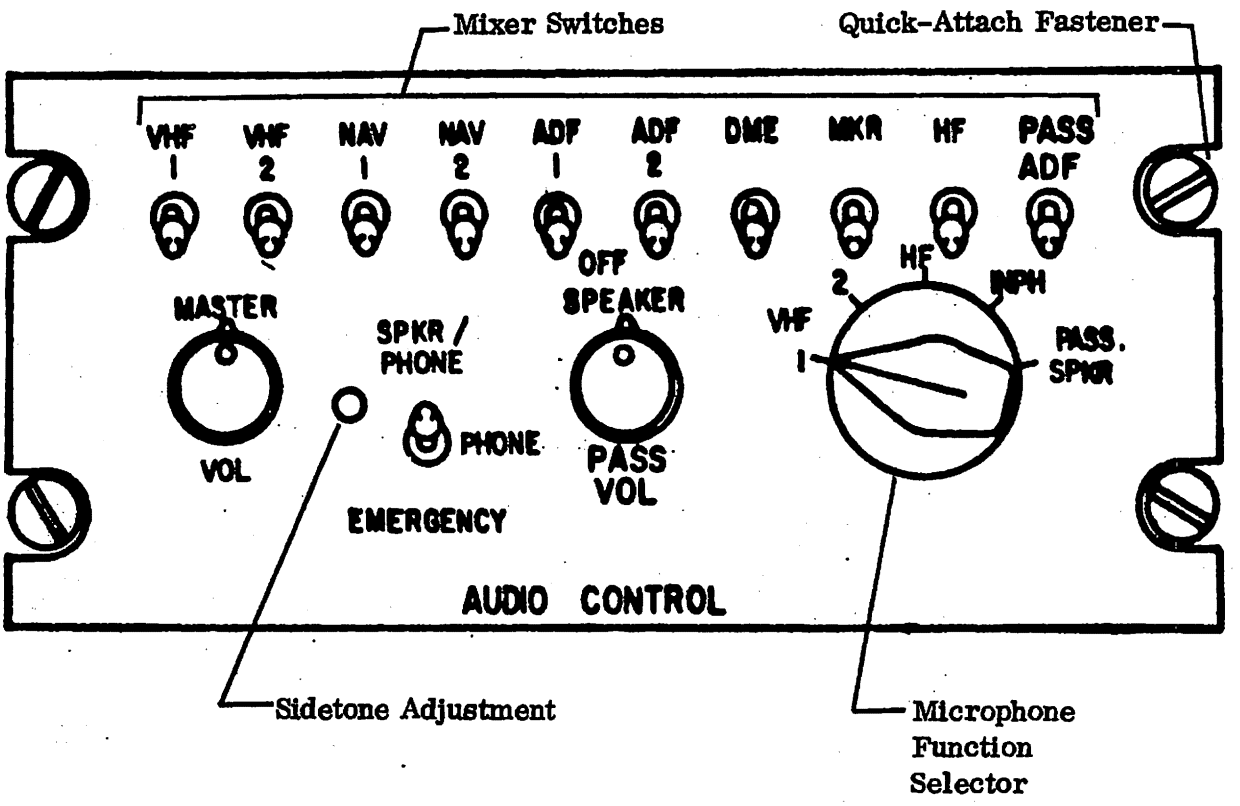
(5) Microphone Function Selector. This is a five-position rotary switch labeled VHF 1, VHF 2, HF, INPH, and PASS SPKR. This switch provides the proper Push-To-Talk and microphone audio inputs for the five functions.

(a) VHF 1, VHF 2, and HF. When in any of these positions, Mic Audio and Push-To-Talk capabilities are provided for the respective transceivers.

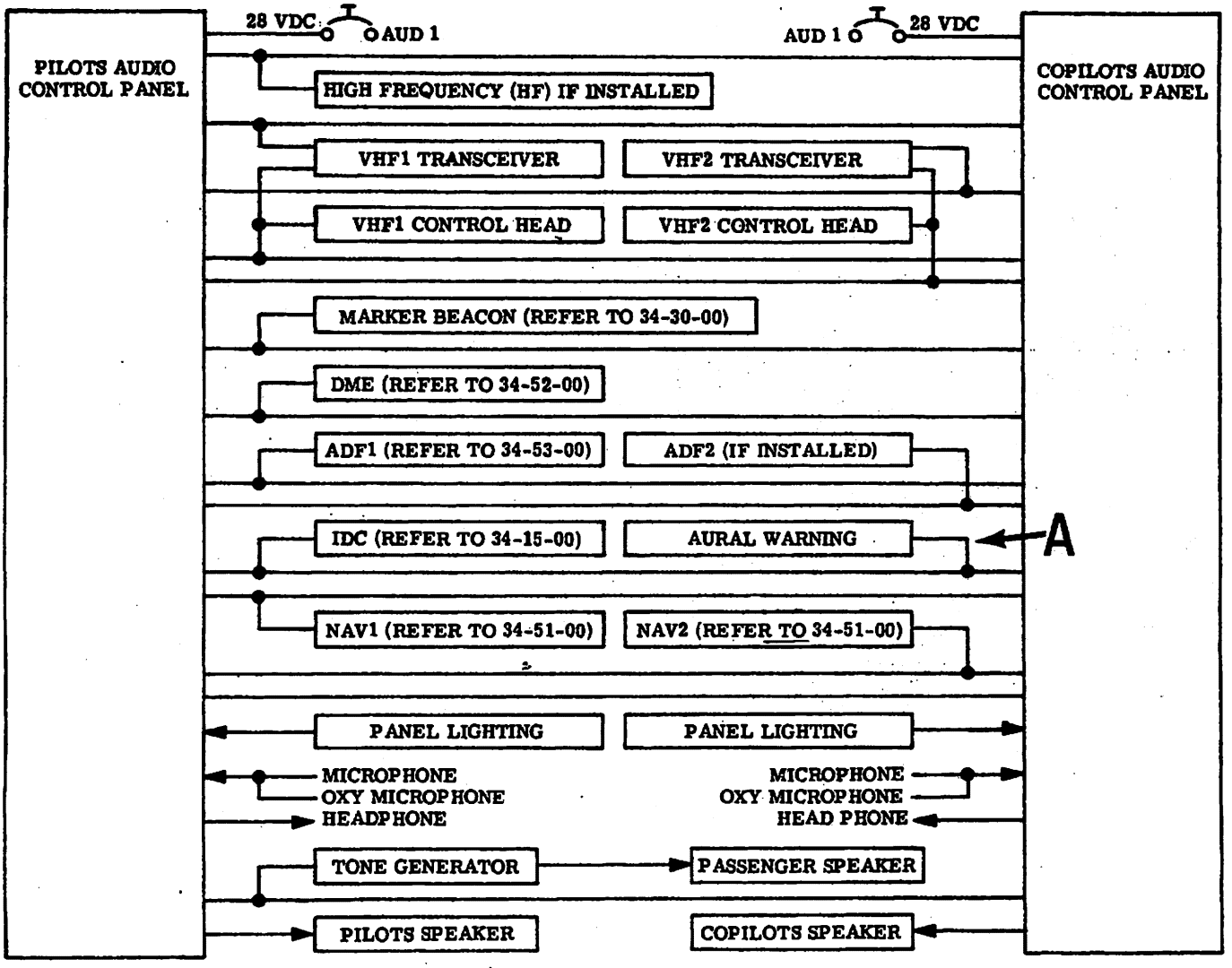
(b) INPH. This position provides interphone when one audio control system panel is in INPH position. Audio will also be provided to the opposite speaker and headphones if the opposite panel Microphone Function Selector is in the VHF 1, VHF 2, HF, or INPH position and headphone audio only when in the PASS SPKR position.

(c) PASS SPKR. When utilizing this position, the pilot or copilot can speak to the passengers through the passenger speaker. If ADF is being transmitted through the passenger speaker, it will automatically be disconnected when the Microphone Function Selector is in the PASS SPKR position. When the passenger speaker is in use, aural warning is automatically transferred to the cockpit speaker and not transmitted to the passengers.

B. Provisions have been made for adjustment of sidetone level and aural warning volume. For further information on these adjustments, refer to Adjustment/Test.



Audio Control Panel
Figure 1



AURAL WARNING — TRIM-IN-MOTION (REFER TO CH. 27.)

Aircraft 25-061, 25-070 thru 25-336, 25-338 thru 25-341 Modified for Horizontal Stabilizer and Autopilot Improvement and 25-337, 25-342 and Subsequent.

Detail A

Audio Integrating System Block Diagram
Figure 2

AUDIO CONTROL PANEL - MAINTENANCE PRACTICES

1. Removal/Installation

NOTE: Removal and installation procedures for pilot's and copilot's audio control panels are identical.

A. Remove Audio Control Panel (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Release quick-attach fasteners on audio control panel.
   (3) Disconnect electrical connector on back of audio control panel.
   (4) Remove audio control panel from aircraft.

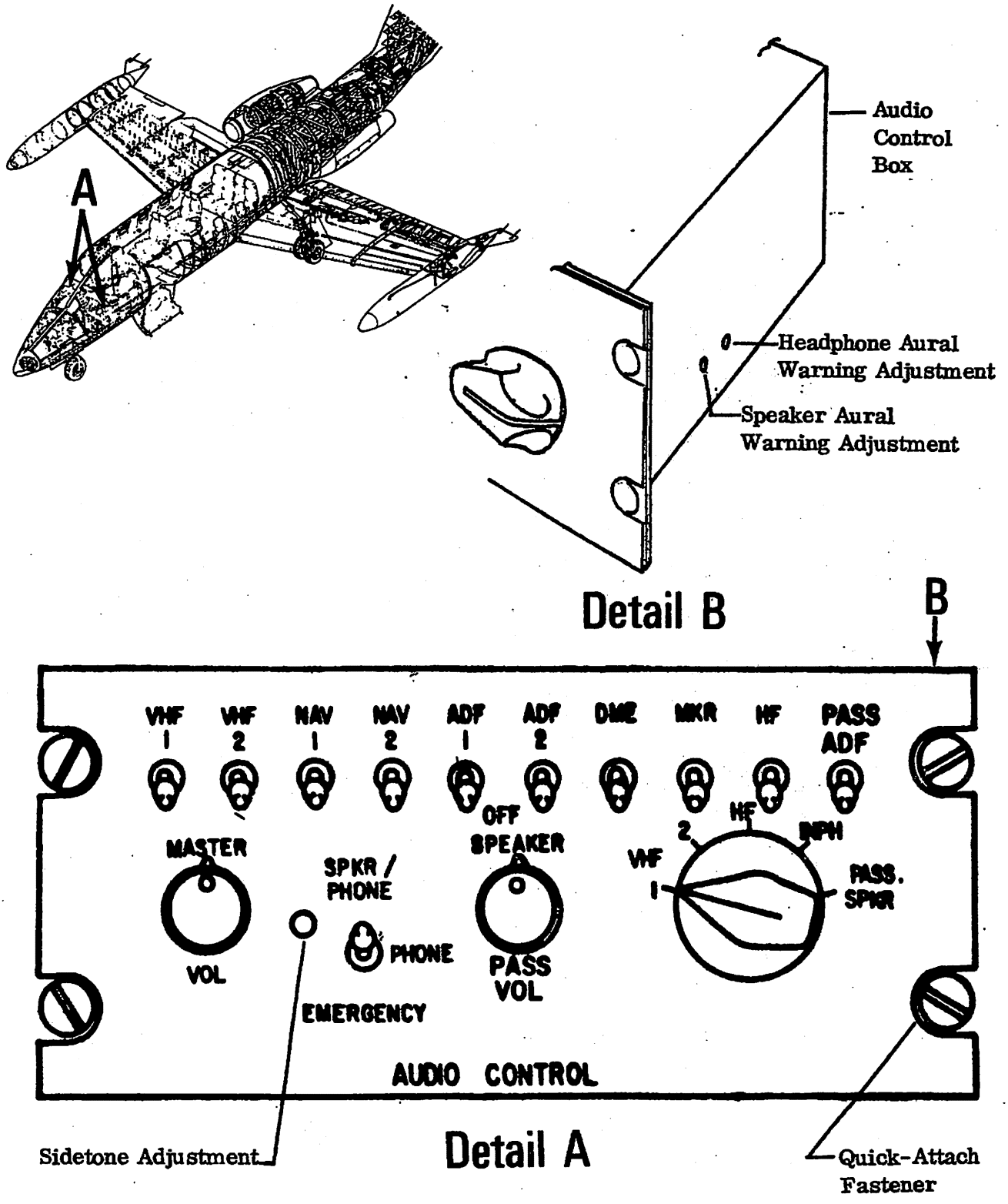
B. Install Audio Control Panel (See figure 201.)
   (1) Connect electrical connector to back of audio control panel.
   (2) Slide audio control panel into instrument panel and secure with quick-attach fasteners.
   (3) Restore electrical power to aircraft.

2. Adjustment/Test

A. A small hole is provided on the front of the audio panel for insertion of a screwdriver for sidetone adjustment. This adjustment should be made with engines operating. Sidetone adjustment regulates audio level to the headphones and cockpit speaker when utilizing VHF1, VHF2, HF (if a separate sidetone is provided for HF), or INPH. The HF volume control and the MASTER VOL control will affect the HF sidetone level on most models since the audio and sidetone use a common line from the HF transceiver. It is suggested that sidetone level be adjusted using VHF1 sidetone. This will simultaneously adjust sidetone for VHF2, HF (if applicable), and INPH.

NOTE: On Aircraft 25-061, 25-070 thru 25-336, 25-338 thru 25-341 modified for Horizontal Stabilizer and Autopilot Improvement and 25-337, 25-342 and Subsequent, the aural warning signal is routed through the trim-in-motion box. (Refer to Chapter 27.) If the trim-in-motion box malfunctions, aural warning signal will not be present at audio control panels.

B. Two small holes are provided on the side of the audio control box for aural warning adjustment. The aft hole is for speaker aural warning adjustment. The forward hole is for headphone aural warning adjustment. Since these adjustments require sliding the audio control panel out of the instrument panel, they should only be accomplished while the aircraft is on the ground.



Audio Control Panel Installation (Typical)
Figure 201

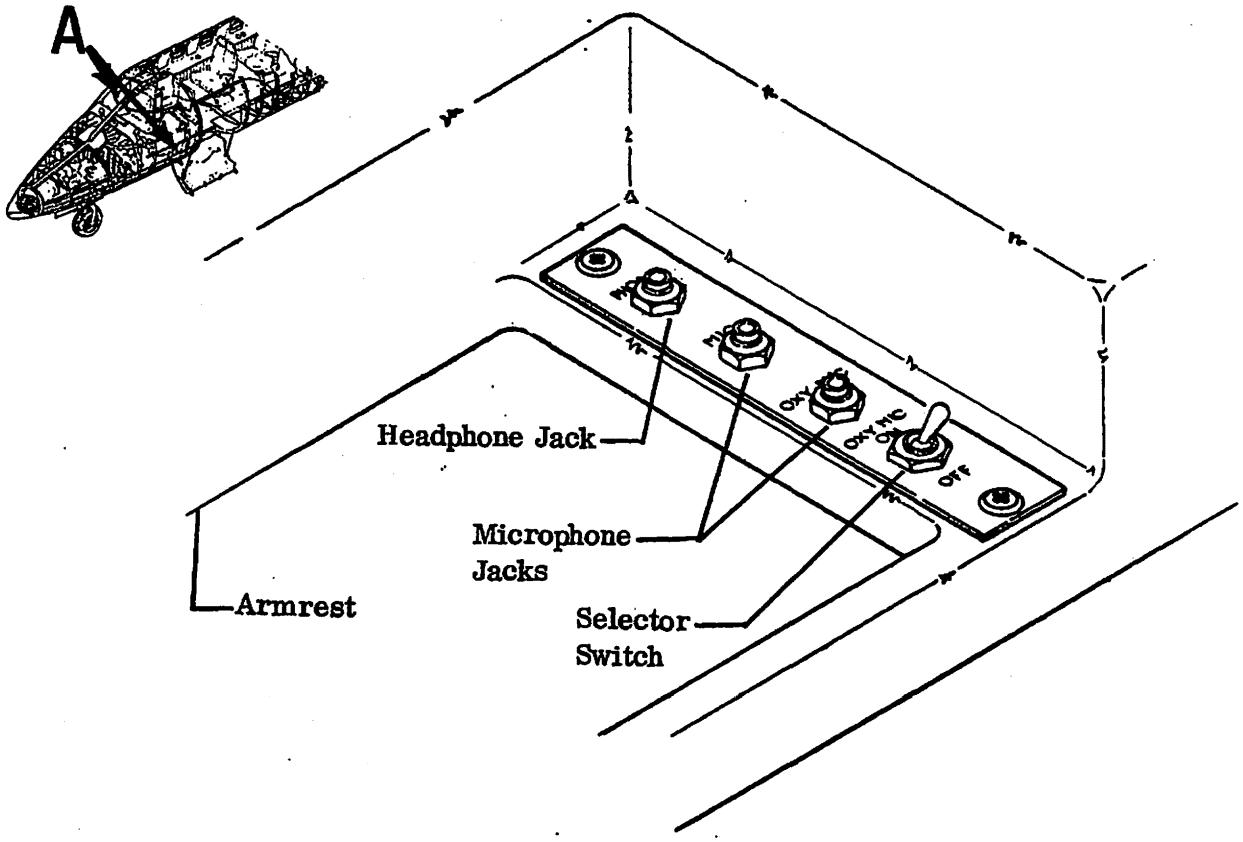
MICROPHONE CONTROL PANEL - MAINTENANCE PRACTICES

1. Removal/Installation

NOTE: Removal and installation procedures for pilot's and copilot's microphone control panels are identical.

A. Remove Microphone Control Panel (See figure 201.)
   (1) Remove attaching parts and remove panel sufficiently to gain access to jack and switch wiring.
   (2) Disconnect and tag wiring.
   (3) If jack or switch replacement is required, remove defective component.

B. Install Microphone Control Panel (See figure 201.)
   (1) Install and secure replacement component.
   (2) Connect wiring to jacks and switch.
   (3) Install panel and secure with attaching parts.



RH Panel Shown

Detail A

Microphone Control Panel Installation (Typical)
Figure 201

9-128B

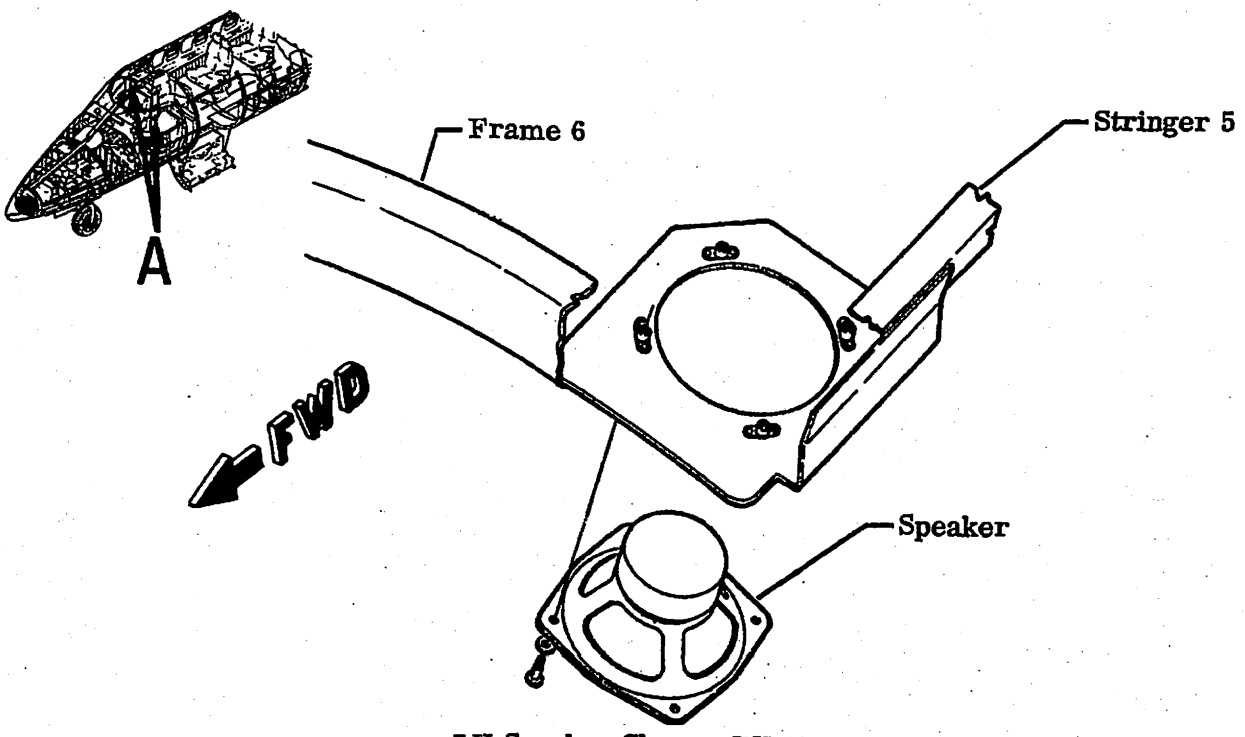
COCKPIT SPEAKER - MAINTENANCE PRACTICES

1. Removal/Installation

NOTE: Removal and installation procedures for pilot's and copilot's speakers are identical.

A. Remove Cockpit Speaker (See figure 201.)
   (1) Remove headliner to gain access to speaker installation.
   (2) Remove attaching parts and remove speaker sufficiently to gain access to speaker wiring.
   (3) Disconnect electrical wiring from speaker. Tag wiring.
   (4) Remove speaker from aircraft.

B. Install Cockpit Speaker (See figure 201.)
   (1) Connect wiring to speaker.
   (2) Install speaker and secure with attaching parts.



LH Speaker Shown, RH Typical

Detail A

Cockpit Speaker Installation
Figure 201

STATIC DISCHARGING - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Static Discharging Wick (See figure 201.)

CAUTION: WRENCH FLATS ARE PROVIDED ON THE WICK RETAINER (METAL PORTION OF THE WICK ASSEMBLY) TO AID IN REMOVAL AND INSTALLATION OF THE WICK. UNDER NO CIRCUMSTANCES SHOULD LEVERAGE BE APPLIED TO THE PLASTIC PORTION OF THE WICK.

(1) Using the wrenching flat on wick retainer, unscrew wick.

NOTE: If wick has been broken off at the stud, application of heat at base of stud will melt retaining compound and ease removal of broken stud. Use a high-wattage soldering gun to apply heat. Never use flame near the aircraft.

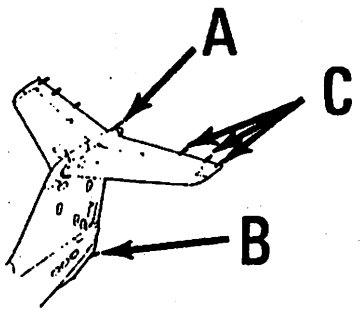
(2) Inspect discharger base to assure that there is no damage to base prior to installing new wick.

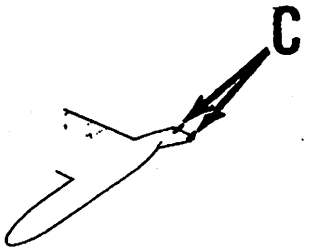
B. Install Static Discharging Wick (See figure 201.)
(1) Apply one drop of Loctite to threads where they enter base.
(2) Screw wick onto base and, using wrenching flat on wick, tighten wick.

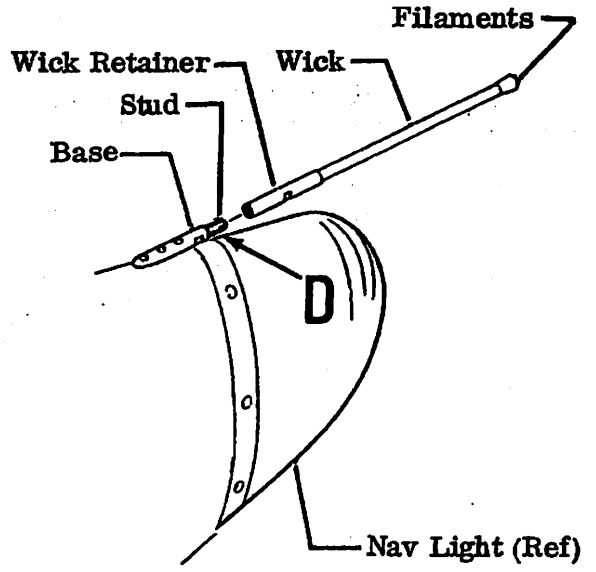
C. Remove Tip Tank Fin Static Discharging Base (See figure 201.)
(1) Drill out the four rivets attaching base to tip tank fin.
(2) Using extreme care not to damage tip tank fin skin, pry off discharger base.

D. Install Tip Tank Fin Static Discharging Base (See figure 201.)
(1) Clean all traces of old adhesive from tip tank fin and buff cleaned area with sandpaper.
(2) Position new base on tip tank fin, align with fastener holes and mark around base. Remove base from fin.
(3) Mix epoxy adhesive, EC-2216 (3M Company), by adding 100 parts by weight of EC-2216-B to 140 parts by weight of EC-2215-A. Blend to a uniform medium gray color. Apply adhesive and position static discharger base on tip tank fin.
(4) Secure static discharger base to tip tank fin using four CR2249-4 rivets.
(5) Repaint surfaces. (Refer to Chapter 20.)

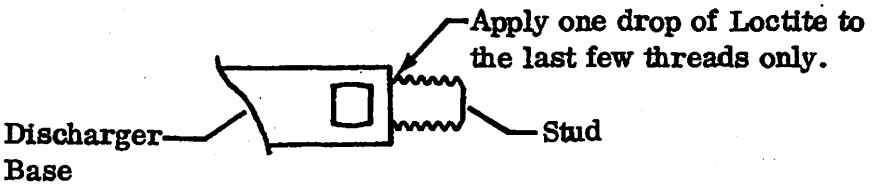
E. Remove Nav Light Fairing or Tailcone Stinger Static Discharger Base (See figure 201.)
(1) Drill out the three rivets attaching discharger base and remove base from aircraft.



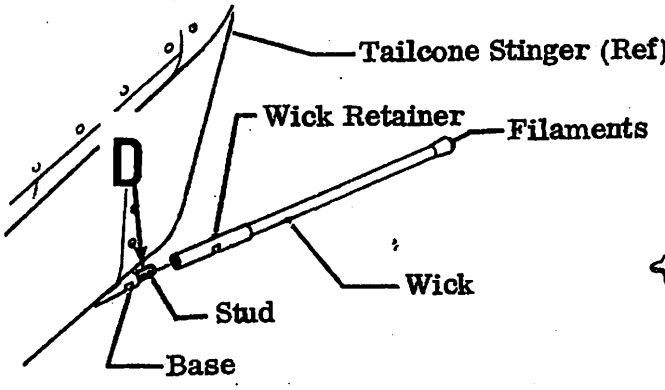




Detail A



Detail D



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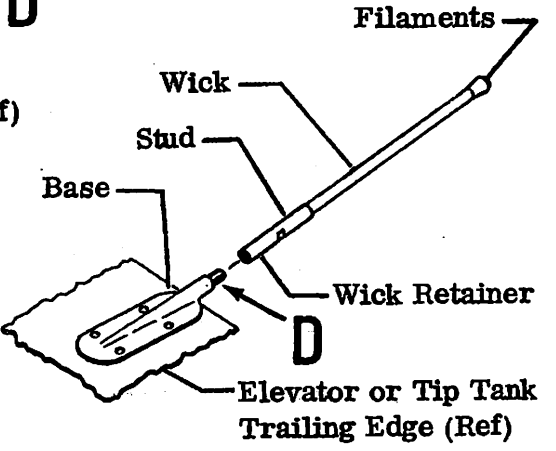


Detail C

Static Discharger Installation
Figure 201

F. Install Nav Light Fairing or Tailcone Stinger Static Discharger Base (See figure 201.)
   (1) Position new discharger base on aircraft and align holes.
   (2) Secure discharger base using CR2248-4-3, CR2248-4-5, and CR2248-4-6 rivets (1 each).
   (3) Apply a bead of Pro-Seal 890 sealant around base of discharger.
   (4) Repaint surface. (Refer to Chapter 20.)

G. Remove Elevator Static Discharger Base (See figure 201.)
   (1) Drill out the four rivets attaching discharger base to elevator.
   (2) Using extreme care not to damage elevator skin, pry off discharger base.

H. Install Elevator Static Discharger Base (See figure 201.)
   (1) Clean all traces of old adhesive from elevator skin and buff cleaned area with sandpaper.
   (2) Position new discharger base on elevator skin and align holes in base with holes in elevator skin. Mark a locating line around discharger base on elevator skin.

   NOTE: When installing either the center or inboard static discharger, the two holes must be located and drilled to match the rivet holes in the elevator trailing edge. These holes may be located from the old discharger base or from the actual holes in the elevator skin. Drill two No. 30 (0.128) diameter holes in discharger base to match holes in elevator trailing edge.

   (3) Mix epoxy adhesive, EC-2216 (3M Company), by adding 100 parts by weight of EC-2216-B to 140 parts by weight of EC-2216-A. Blend to a uniform gray color. Apply adhesive and position static discharger base on elevator.
   (4) Secure discharger base to elevator. Use four CR2249AD4 rivets on outboard discharger base. On center and inboard dischargers, use two CR2249AD4 rivets on leading edge portion of discharger and two MS20470B4 rivets on trailing edge.
   (5) Fill the two unused holes in center and inboard discharger bases with EC-2216 epoxy. Sand flush.
   (6) Repaint surface. (Refer to Chapter 20.)

2. Adjustment/Test

A. Perform Functional Test of Static Discharge Wick Installation
   (1) Using a digital ohmmeter with pin tip test probes, touch one probe to the nearest bare metal on the aircraft skin and touch the other probe to the wick retainer (metal portion of the wick). Resistance shall be less than 0.2 ohm for a newly installed base and 0.5 ohm maximum for an existing installation.

   NOTE: Do not use a bonding meter or high-current test set.

(2) If resistance is higher than stated in step (1), proceed as follows.
- (a) Unscrew wick from base and clean threads inside wick retainer.
- (b) Apply heat to stud to melt retaining compound. Unscrew stud from base.
- (c) Clean threads inside base.
- (d) Screw stud into base until stud bottoms out.
- (e) Back stud out approximately two threads. Apply a very small amount of Nylok VC3 or equivalent retaining compound to one or two threads of the stud adjacent to base. Tighten stud into base.

NOTE: Use retaining compound sparingly because it is non-conductive. The base/stud/wick assembly must have metal-to-metal contact through the threads.

- (f) Screw wick onto stud.
- (g) Remeasure resistance. If resistance exceeds values in step (1), remove, clean, and reinstall base.

(3) Again connect probes to aircraft skin and wick retainer. Apply alternate side loads to the discharge base while observing ohmmeter. Resistance shall not vary while applying load.

(4) If resistance varies while performing step (3), the base must be removed and reinstalled.

(5) Set up megohmmeter to test wick installation resistance at 500 volts as follows:

NOTE: The following procedure is for a General Radio Model 1863 megohmmeter. Equivalent substitutes may be used.

- (a) Set test voltage to 500.
- (b) Set dial to 10M scale.
- (c) Set switch to DISCHARGE.
- (d) Touch negative probe to metal sleeve of static wick.
- (e) Touch positive probe to the discharge wick filaments.

NOTE: Use a large, smooth probe to make connection to the wick filaments. Use care not to push the wick filaments down into the wick.

- (f) Set Power Switch to ON.
- (g) Set switch to CHARGE.

CAUTION: DO NOT TOUCH AIRCRAFT SKIN (OR METAL SLEEVE OF WICK) AND WICK AT THE SAME TIME DURING MEASUREMENT. READ MANUFACTURER'S INSTRUCTIONS FOR MEGOHMMETER OPERATION BEFORE USING.

(6) After the red DANGER light has illuminated, switch to MEASURE. The resistance shall be 8 to 100 megohms. If resistance is greater than 50 megohms, set dial to 100 M scale.

(7) If resistance is not within limits, replace wick.

3. Inspection/Check

A. Inspect Static Discharge Wicks

(1) Inspect to assure that plastic wick is secure in metal wick retainer. Replace wick if loose.

(2) Inspect lightning diverter strip (gray strip along plastic wick) for cracks or peeling. Replace wick if strip is cracked or peeling.

(3) Inspect plastic portion of wick for general condition.

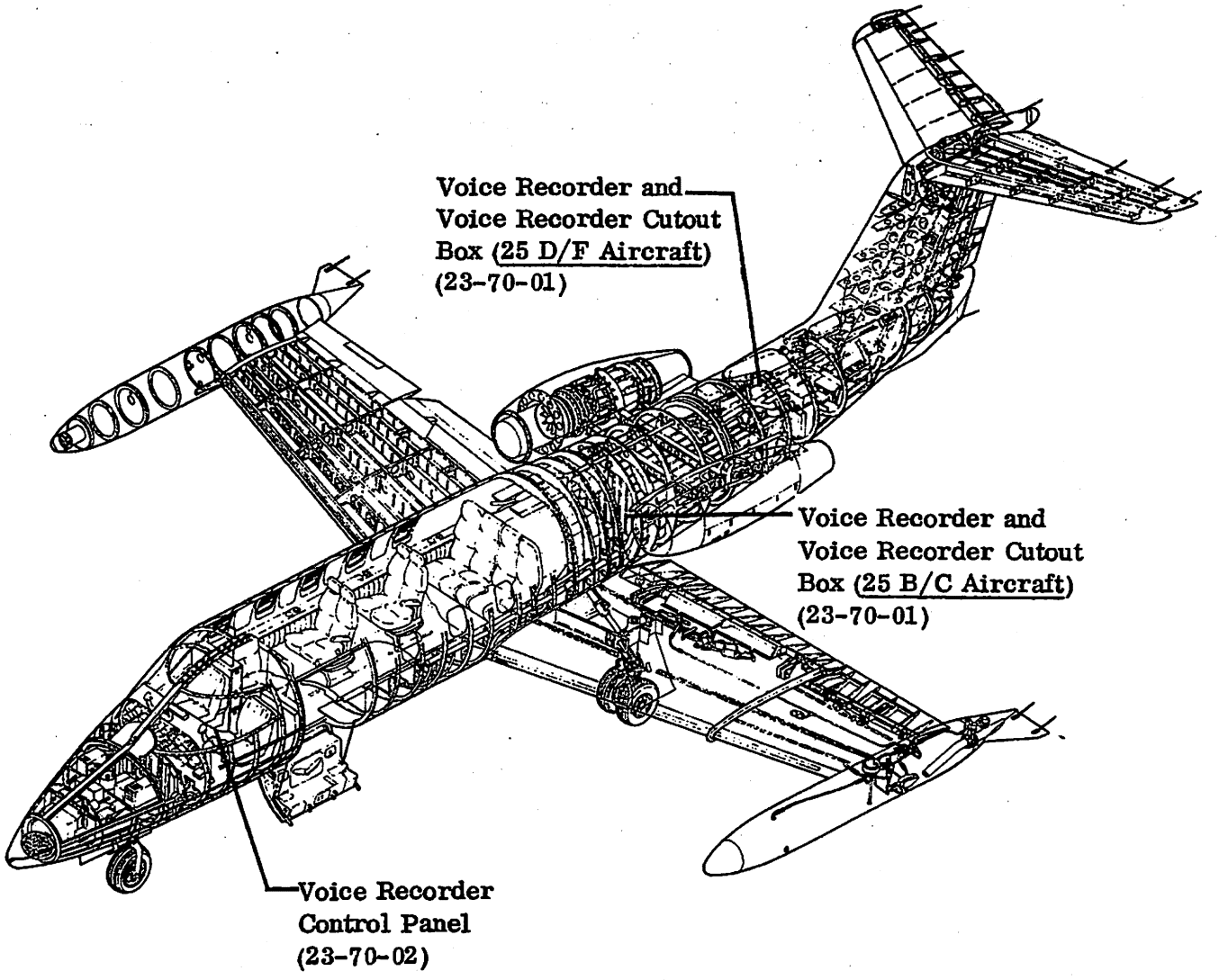
(4) Inspect wick filaments. Filaments should be visible in the wick retainer cone. Replace wick if the total number of filaments is less than approximately 10% of a new wick.

(5) Inspect each discharger base to assure that there is no relative movement between base and aircraft skin. Base must be reinstalled if movement is detected.

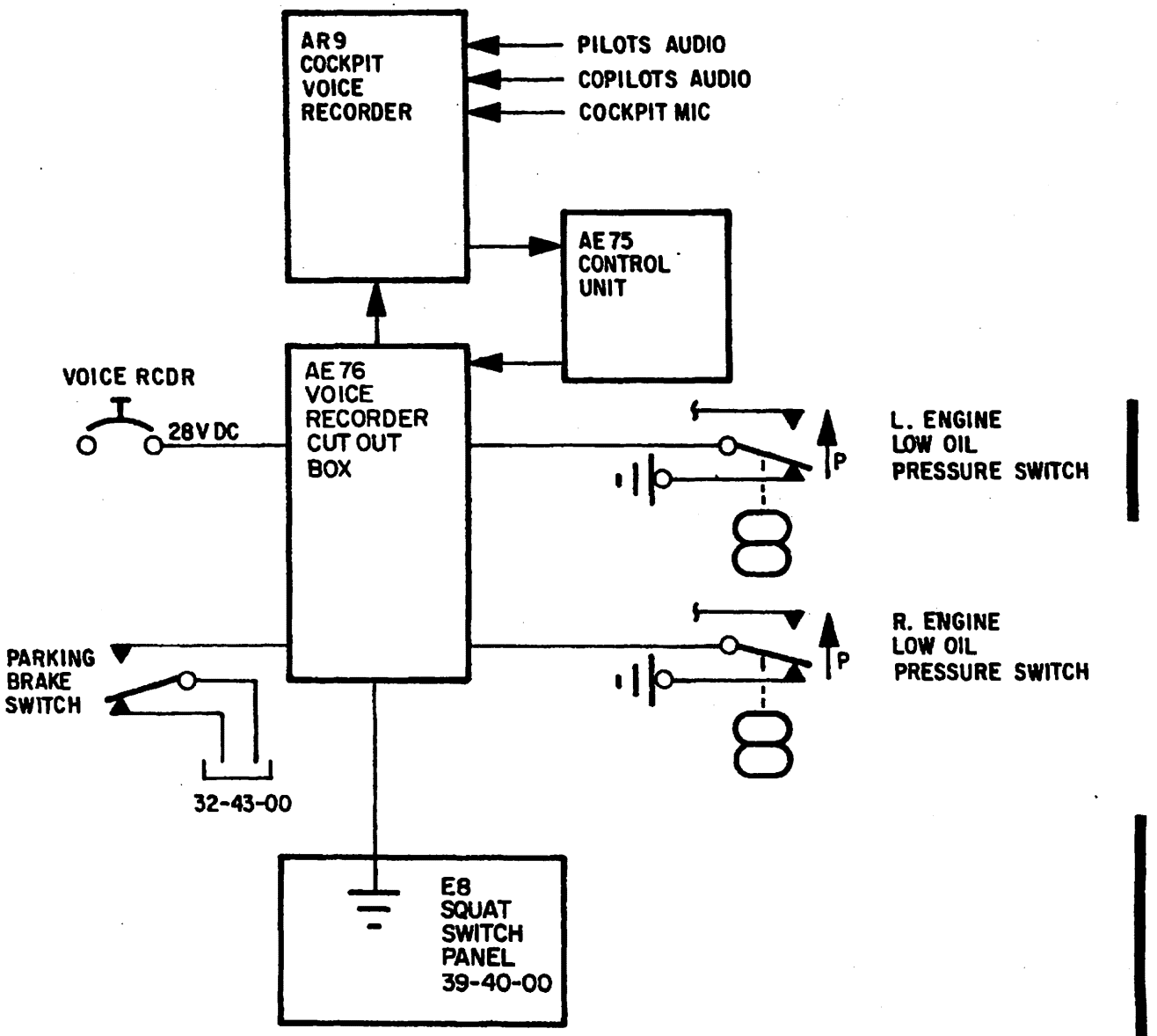
VOICE RECORDER - DESCRIPTION AND OPERATION

1. Description (See figures 1 and 2)
   A. On 25 B/C Aircraft, the voice recorder is installed on the LH side of the baggage compartment between frames 19 and 21. On 25 D/F Aircraft, the voice recorder is installed on the RH side of the tailcone between frames 27 and 28. The voice recorder cutout box is installed just aft of the voice recorder in both installations. The control panel is installed in the center pedestal.
   B. The voice recorder porvides continuous recording of the last 30 minutes of all flight crew conversations to aid in crash investigation. The system is in operation whenever the aircraft is airborne.
   C. Operation of the voice recorder system can be divided into four modes: the record mode, the monitor mode, the erase mode, and the self-test mode.
      (1) The record mode provides record capabilities from four separate flight stations; however, only three are used.
      (2) The monitor mode provides monitoring of recorded conversations from each channel/track to ensure proper operation.
      (3) The erase mode enables the pilot to completely erase the last 30 minutes of conversation on the tape. Erasure can only be accomplished after the aircraft has landed and the parking brake has been set.
      (4) The self-test mode provides for the generation of an internal 800 Hz test signal which is applied to the record heads and monitored aurally or visually for each channel/track, either individually or simultaneously.

2. Operation (See figures 1 and 2.)
   A. With the Battery Switch(es) on and the VOICE RCDR circuit breaker depressed, the voice recorder is in operation. However, with the aircraft on the ground and the parking brake set, the bulk erase mode is also operative. The parking brake switch completes a 28 vdc circuit to the erase mode control relay within the voice recorder cutout box while the squat switches complete a ground circuit.
   B. The RH and LH engine low oil pressure switches are electrically connected to a safety shutdown circuit within the voice recorder cutout box. If a crash occurs wherein power should remain on the voice recorder, the voice recorder will continue to operate. The oil pressure switches apply a ground to this safety shutdown circuit. The ground triggers a programmed unijunction transistor which shuts down the recorder approximately 6 to 10 minutes after the ground is applied and leaves the last 20 minutes of recording.
   C. For further information on the voice recorder, refer to Collins Maintenance Manual Publication No. 523-0757366-201114.



Voice Recorder Equipment Locator
Figure 1



Voice Recorder Block Diagram
Figure 2

EFFFECTIVITY: OPTIONAL

VOICE RECORDER - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Voice Recorder (25 B/C Aircraft) (See figure 201.)

(1) Remove electrical power from aircraft.

(2) Remove cover over voice recorder/flight recorder installation in LH aft side of baggage compartment by lifting up on Velcro tabs with fingers.

(3) Disengage hold-down clamps on voice recorder rack.

(4) Grasp handle of voice recorder and disengage voice recorder from rack by pulling forward.

(5) Remove voice recorder from aircraft.

B. Install Voice Recorder (25 B/C Aircraft) (See figure 201.)

CAUTION: CARE MUST BE TAKEN TO ALIGN PLUG IN VOICE RECORDER WITH PINS ON VOICE RECORDER RACK OR DAMAGE MAY RESULT.

(1) Install voice recorder and tighten hold-down clamps.

(2) Install cover by pressing down on Velcro tabs.

(3) Restore electrical power to aircraft.

(4) Perform operational check of voice recorder system.

C. Remove Voice Recorder (25D/F Aircraft) (See figure 201.)

(1) Remove electrical power from aircraft.

(2) Disengage hold-down clamps on voice recorder rack on RH side of tailcone.

(3) Grasp handle of voice recorder and disengage voice recorder from rack by pulling forward.

(4) Remove voice recorder from aircraft.

D. Install Voice Recorder (25 D/F Aircraft) (See figure 201.)

CAUTION: CARE MUST BE TAKEN TO ALIGN PLUG IN VOICE RECORDER WITH PINS ON VOICE RECORDER RACK OR DAMAGE MAY RESULT.

(1) Install voice recorder and tighten hold-down clamps.

(2) Restore electrical power to aircraft.

(3) Perform operational check of voice recorder system.

E. Remove Voice Recorder Cutout Box (See figure 201.)

(1) Remove electrical power from aircraft.

(2) Gain access to cutout box. (See paragraphs A and C.)

(3) Disconnect electrical connector from cutout box.

(4) Remove attaching parts and cutout box from mounting rack.

F. Install Voice Recorder Cutout Box (See figure 201.)
(1) Install cutout box on mounting rack and secure with attaching parts.
(2) Connect electrical connector to cutout box.
(3) Install any parts removed in step E. (2).
(4) Restore electrical power to aircraft.
(5) Perform operational check of voice recorder system.

2. Inspection/Check
A. Tools and Equipment

NOTE: The following equipment or the equivalent is required to operationally check the voice recorder system.

NAME	PART NO.	MANUFACTURER	USE
Noise Cancelling Microphone	Model TEL-66T	Telex Acoustic Prod. Co.	
Headphones	Type P-23 600 ohm	William J. Murdock	
Headset Extension	50 foot	Commercially Available	

B. Operationally Check Voice Recorder System.

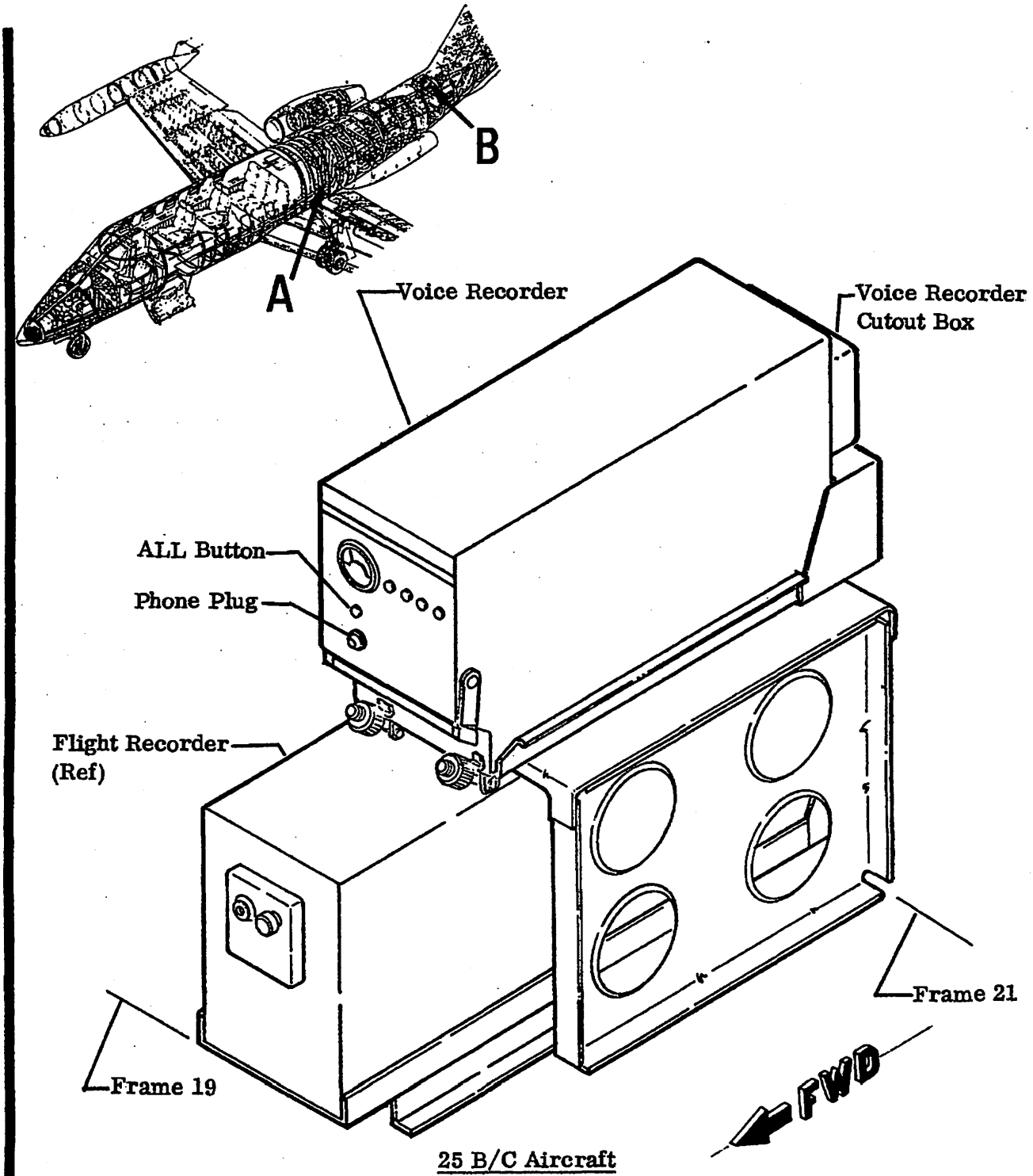
NOTE: The following operational check is applicable to both the Collins AVR-101 and the Fairchild A-100 voice recorder systems.

(1) Connect external electrical power source to aircraft.
(2) Set Battery Switch(es) on and monitor aircraft dc voltmeter for 28 vdc.
(3) Monitor the "ON" (green) and "TRIP" (red) indicator lights on the cutout box.
(4) Within 3 to 10 minutes after Battery Switch(es) are set on, the "ON" (green) light shall extinguish and the "TRIP" (red) light shall illuminate. This indicates the voice recorder is operational.
(5) Set Battery Switch(es) off. Wait approximately 10 seconds; then set Battery Switch(es) on.
(6) Connect headphone to copilot's audio panel.
(7) Depress channel 2 button or rotate selector switch to channel 2 on voice recorder.
(8) Speak into microphone. Playback will occur approximately 1 second after an aural input.

(9) Depress TEST button on control panel for approximately 1 second and note 800 Hz tone.
(10) Disconnect microphone from copilot's audio panel and connect to pilot's audio panel.
(11) Depress channel 3 button or rotate selector switch to channel 3 on voice recorder.
(12) Depress TEST button on control panel and speak into microphone. Playback will occur approximately 1 second after an aural input.
(13) Disconnect headphone jack from voice recorder and microphone from pilot's audio panel.
(14) Connect headphone jack to control panel headphone plug.
(15) Depress ALL button or rotate selector switch to ALL on voice recorder.
(16) Speak into microphone located on control panel. Playback will occur approximately 1 second after an aural input.
(17) Playback should be loud and clear on all channels with very little background noise.

NOTE: Channel 1 is not utilized.

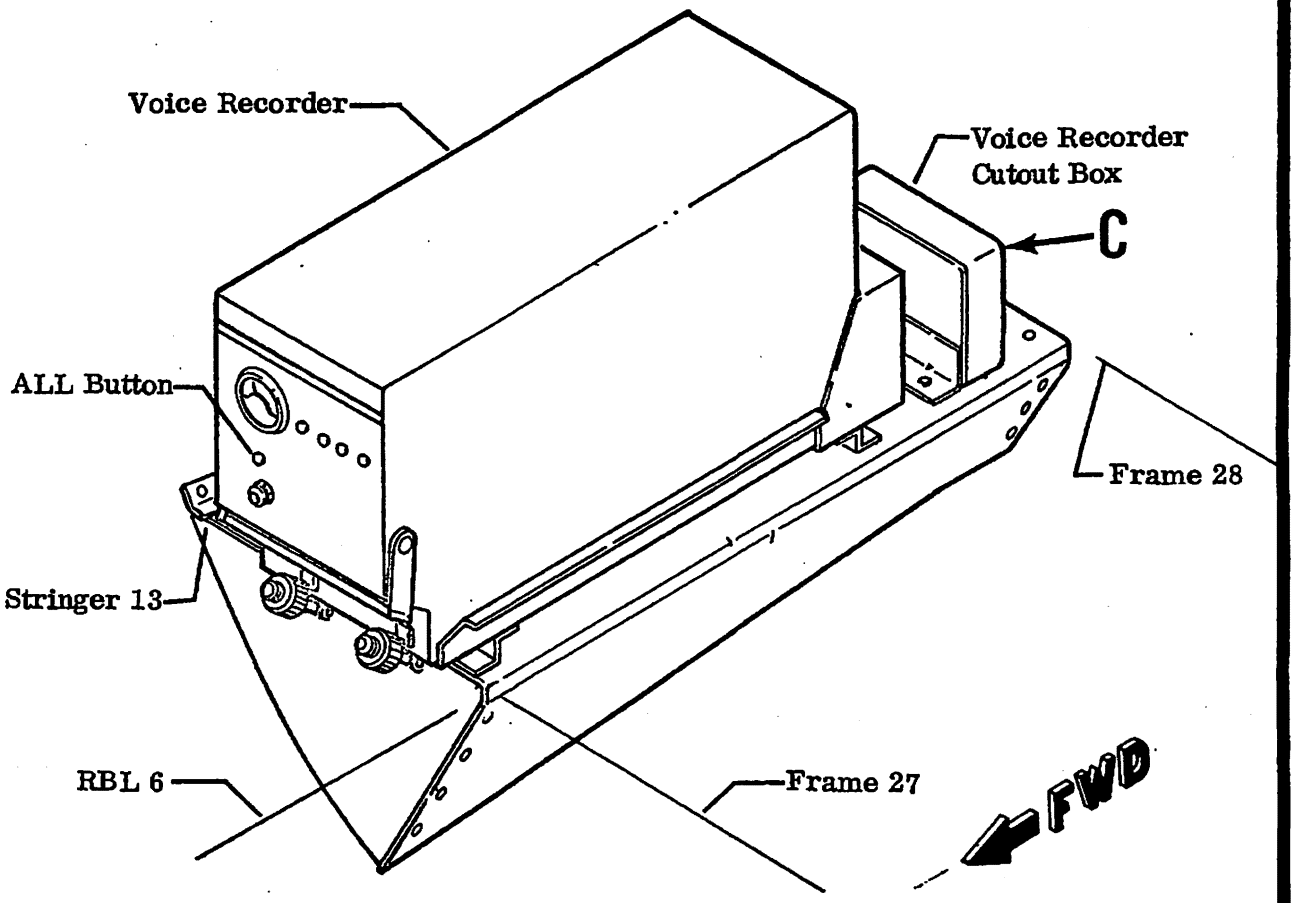
(18) Ensure that parking brake is set.
(19) Depress ERASE button on control panel. Hold for at least 7 seconds. This will ensure complete tape erasure.



25 B/C Aircraft

Detail A

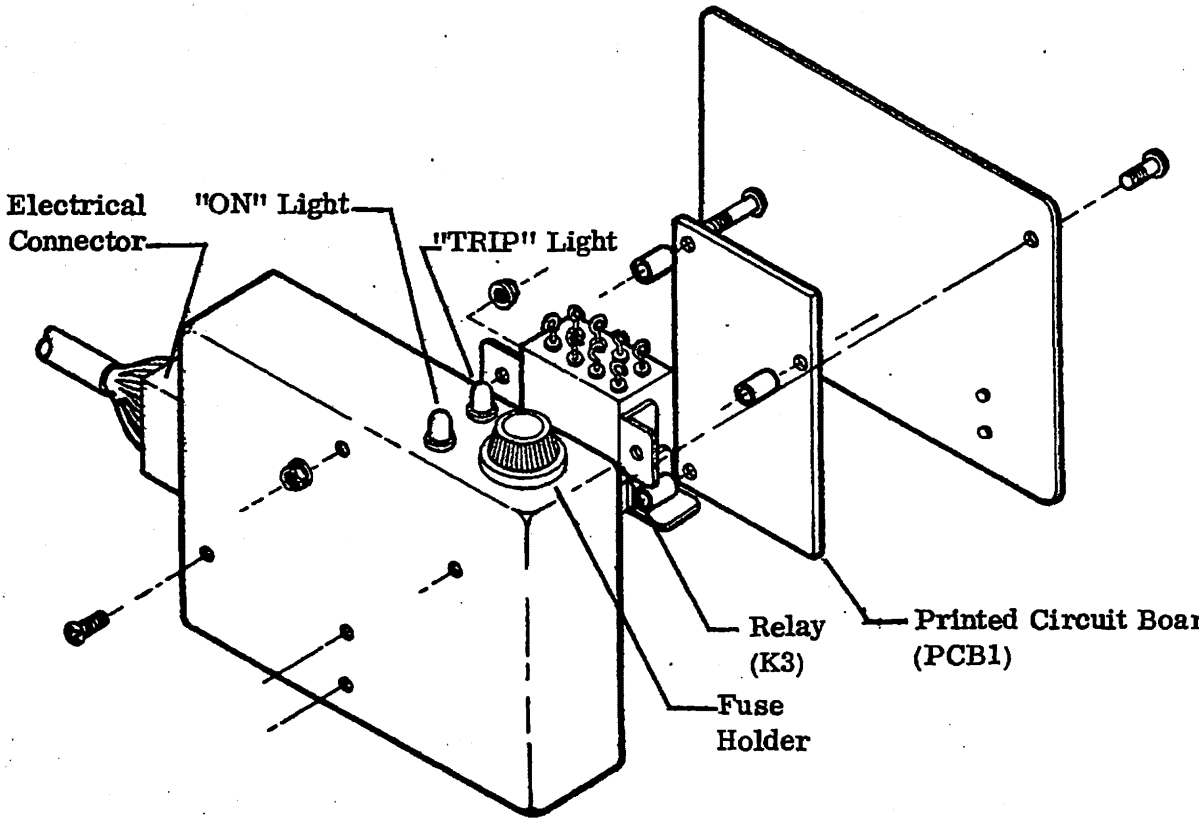
Voice Recorder/Cutout Box Installation
Figure 201 (Sheet 1 of 3)



25 D/F Aircraft

Detail B

Voice Recorder/Cutout Box Installation
Figure 201 (Sheet 2 of 3)



Voice Recorder Cutout Box

Detail C

Voice Recorder/Cutout Box Installation
Figure 201 (Sheet 3 of 3)

VOICE RECORDER CONTROL PANEL - MAINTENANCE PRACTICES

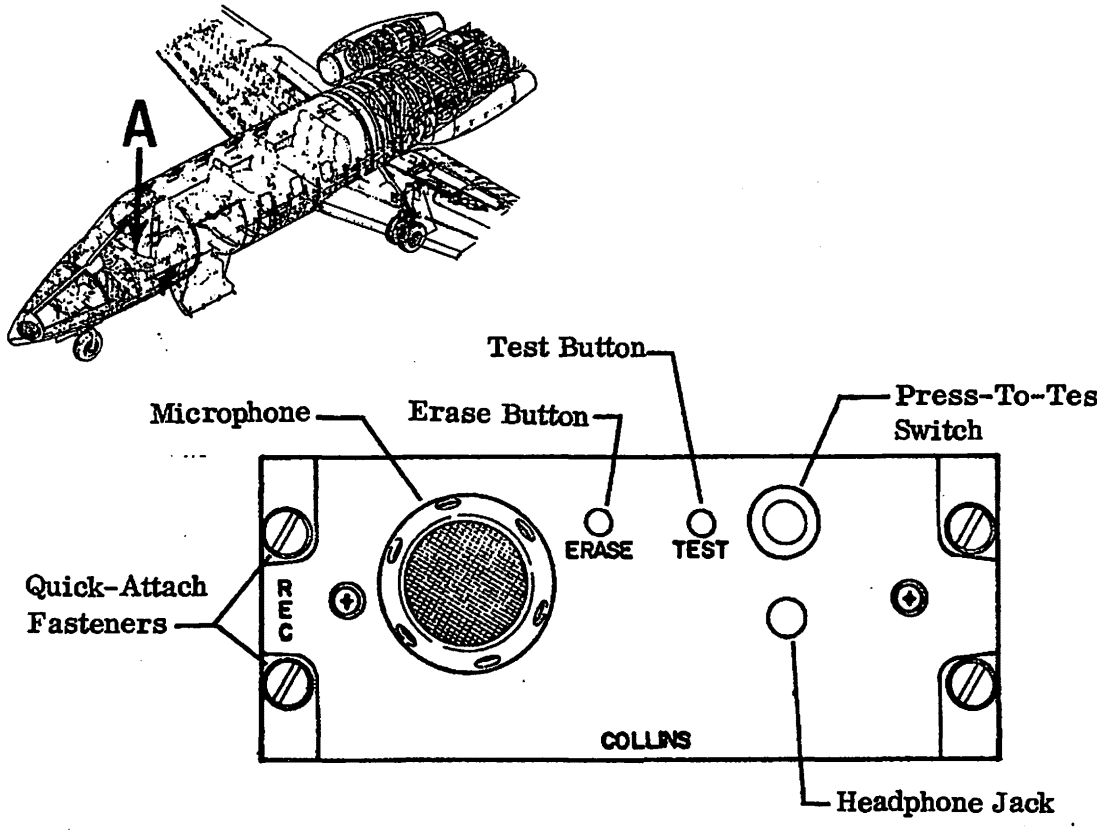
1. Removal/Installation

A. Remove Voice Recorder Control Panel (See figure 201.)

(1) Remove electrical power from aircraft.
(2) Disconnect quick-attach fasteners from pedestal.
(3) Disconnect electrical connector from control panel.
(4) Remove control panel from aircraft.

B. Install Voice Recorder Control Panel (See figure 201.)

(1) Connect electrical connector to control panel.
(2) Install control panel and fasten quick-attach fasteners.
(3) Restore electrical power to aircraft.



Detail A

Voice Recorder Control Panel Installation
Figure 201